



18TH INTERNATIONAL CONGRESS
OF PHONETIC SCIENCES
10-14 AUG 2015 SECC GLASGOW UK

BOOK OF ABSTRACTS

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THE UNIVERSITY of EDINBURGH

Book of Abstracts
of the
18th International Congress of
Phonetic Sciences

10-14 August 2015
Glasgow, Scotland

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Previous Congress Locations

1st	Amsterdam, the Netherlands	(1932)
2nd	London, UK	(1935)
3rd	Ghent, Belgium	(1938)
4th	Helsinki, Finland	(1961)
5th	Münster, Germany	(1964)
6th	Prague, Czech Republic	(1967)
7th	Montreal, Canada	(1971)
8th	Leeds, UK	(1975)
9th	Copenhagen, Denmark	(1979)
10th	Utrecht, the Netherlands	(1983)
11th	Tallinn, Estonia	(1987)
12th	Aix-en-Provence, France	(1991)
13th	Stockholm, Sweden	(1995)
14th	San Francisco, USA	(1999)
15th	Barcelona, Spain	(2003)
16th	Saarbrücken, Germany	(2007)
17th	Hong Kong, China	(2011)

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Message from the Chair of the Local Organizing Committee for the 18th ICPhS

Ceud mile fàilte! Fair faw ye!* On behalf of the Scottish phonetics community, welcome to Glasgow, “the dear green place”, for the 18th International Congress of Phonetic Sciences (ICPhS 2015)! I’m delighted that we are able to host this conference at the SECC, beside the renovated River Clyde and close to Glasgow’s lively and elegant city centre.

At least since the days of Alexander Graham Bell, phonetic research has been at home in Scotland. Phonetic sciences were part of the Speech and Language Therapy programme in the Glasgow School of Speech Therapy, founded by Anne H. McAllister at Jordanhill College, in the 1930s (and now continued at Strathclyde University). The academic subject was established here shortly after the Second World War, when a phonetics department was founded at Edinburgh University, and a lecturer in phonetics was appointed at Glasgow University. And phonetics was also an integral part of the course offered by the Edinburgh School of Speech and Language Therapy since 1946, now continued by Queen Margaret University Edinburgh.

Since these early days, phonetics in Scotland has flourished and diversified so that now members of our Scottish Consortium together represent most of the major subfields of phonetics researched today, including speech production and perception, sociophonetics, laboratory phonology, speech synthesis and recognition, phonetic fieldwork, and communication disorders. This is reflected at this Congress; we are very proud that Scotland has contributed almost a third of the papers from the UK. It has been both very enjoyable and a privilege to work with my colleagues across this range of phonetics over the past five years, to prepare for this conference.

Now that you are in Scotland, I hope that you will enjoy taking part in the conference and the substantial programme offered by our distinguished plenary speakers, the innovative discussant sessions, and the wide-ranging papers from across the international phonetics community. We are all excited by the large number of papers and delegates who will be taking part in this Scottish Congress.

Finally, I hope that (in your spare moments) you will be able to make the most of the city of Glasgow and the attractions it has to offer (if you like museums, take this opportunity to visit the wonderful Burrell collection – like all Glasgow’s museums, it’s free, but it will be closed from 2016-2020), as well as the beautiful local scenery (possibly with a light waterproof jacket), lochs and islands which can be visited in a single day, and of course, Scotland’s capital city, Edinburgh, is less than an hour away (you might catch a show or two at its world-famous International Festival or at the ‘Fringe’).

Thank you for making the trip to Scotland – enjoy your time with us.

Jane Stuart-Smith
Chair of the Local Organizing Committee for ICPhS 2015

**Ceud mile fàilte* [cʰiət m̩i:l̩ə fa:l̩t̩ə] is ‘a hundred thousand welcomes’ in Gaelic. *Fair faw ye* [feɪ̯ fo̯ ji] is a Scots blessing wishing good fortune.

Welcome from the President of the Permanent Council of the ICPhS

Dear colleagues,

On behalf of the Permanent Council for the Organization of the International Congress of Phonetic Sciences, it is with great honor and pleasure that I welcome you to the 18th International Congress of Phonetic Sciences. It is the first time the Congress is being held in Scotland, organized by a consortium of four Scottish Universities. Scotland has had a long and rich tradition in phonetic research and teaching and has been privileged with the presence and inspiring work of many eminent phoneticians over the years and to this date. Its institutions have fostered interdisciplinary collaboration among scientists which have led to very important developments and new orientations in both basic and applied research in the phonetic sciences. This is the third time the Congress is in the UK and the 18th ICPhS returns to the country exactly 80 years after the 2nd ICPhS held in London in 1935 and 40 years after the 8th ICPhS in Leeds. This year's ICPhS also marks the 15th Congress to be held in a European country.

The ICPhS has been organized under the auspices of the International Phonetic Association since 2003. Since the last Congress in Hong Kong in 2011, work has been underway in making past proceedings available online at the website of the International Phonetic Association. While working on this, I have had the opportunity to discover a wealth of information on the history of the ICPhS and important landmarks and developments since the first Congress in Amsterdam in 1932. I would like to share some of this information with you and to briefly elaborate on four keywords that I believe have marked the evolution of the Congress over the past 83 years. These keywords are *divergence, co-operation, convergence, and continuity*. The diversity of disciplines that first came together in the Amsterdam Congress was one of the most remarkable features of this event. The first Congress brought together linguistics, biologists, physicists, physiologists, physicians, psychologists and psychiatrists. These scientists spoke different codes and were familiar with different methodologies, research tools and analyses protocols. A remarkable achievement of this first Congress was that it managed to set the foundations for the constructive collaboration of scientists from diverse fields all of whom, however, had a common scientific goal, that of understanding different aspects of speech sounds. Co-operation among scientists since then has led the phonetic sciences from this Babylon state of affairs to a remarkable multidisciplinary convergence where scientists work together, complement and advance research methods and analyses procedures, leading to a more comprehensive and global understanding of human spoken language and communication. At the same time, new challenging questions are posed which lead to further advances in methodology and analyses and necessitate further collaboration among scientists from different fields. This promotes continuity as well as expansion and innovation in the phonetic sciences. Continuity is also evidenced by the new scientists entering the field. One of the most important functions of Congresses has been the opportunity they offer to scientists, whether established and new, to meet in a common forum, exchange ideas and share experiences.

Congress statistics provide evidence of the above. While all papers were single-authored in the 1st ICPhS in Amsterdam, 611 papers are co-authored in the 18th ICPhS indicating that co-operation between scientists is currently very well-established in the field. Continuity and productiveness in the phonetic sciences is evidenced by the large number of papers that will be presented in this Congress (a total of 774 papers) and by the high percentage of papers submitted by students and accepted for presentation (35%; a total of 267 papers).

Before concluding, I would like to point out that to date only three Congresses were held outside Europe; Montreal (1971), San Francisco (1999) and Hong Kong (2011). One of the tasks of the Permanent Council for the Organization of the ICPhS is to ensure that there is rotation of Congresses among countries and continents. Work is currently underway towards the organization of future Congresses in continents and countries where the Congress has not been held before.

I would like to conclude by expressing our sincere thanks and gratitude to the local organizing committee for all the hard work they have put into the realization of this Congress over the past four years. The organization of such a large-scale event is indeed very complex and challenging and we thank them deeply for their commitment, their dedication and all the novel approaches they have introduced throughout the different organizational stages. I wholeheartedly wish the organizers a very successful Congress, and all participants very fruitful and stimulating discussions on current progress and future avenues of research in the phonetic sciences. I am certain that this Congress will continue the long tradition of fostering new collaborations among scientists and promoting developments and innovation in the phonetic sciences.

Katerina Nicolaidis

President of the Permanent Council for the Organization of the ICPhS

Welcome from the Four Host Universities in the Scottish Consortium

THE UNIVERSITY
of EDINBURGH



Professor Dorothy Miell
Vice-Principal and Head of the College of
Humanities and Social Science

As the head of the College of Humanities and Social Sciences at the University of Edinburgh, I am delighted to welcome you to Scotland for the International Congress of Phonetic Sciences. The University of Edinburgh is proud of its history of phonetics research, as evidenced by an illustrious list of former staff members, including David Abercrombie, Ian Catford, Peter Ladefoged, John Laver, and Betsy Uldall. Today, Phonetics at the University of Edinburgh is housed within the Department of Linguistics & English Language, in the School of Philosophy, Psychology & Language Sciences, acknowledged to be one of the strongest departments for Linguistics research and teaching nationally and internationally. Research in Phonetics here includes work in speech production, speech perception, prosody, the phonetics of sound change, field phonetics, second language acquisition, language development, the interface between phonetics and phonology, sociophonetics, and speech technology. We hope you will thoroughly enjoy your phonetic experience in Glasgow and visit Scotland again in the near future.



Roibeard O Maolalaigh
Vice-Principal / Head of the College of Arts,
Professor of Gaelic

Fàilte oirbh uile gu Baile Ghlaschu. [fa:l̪it̪ə ɔr̪iəv uil̪ə kə pal̪ə y̪glasəxɔ] As Vice-Principal / Head of the College of Arts and as Professor of Gaelic, I am delighted to welcome you to Glasgow for ICPhS 2015, on behalf of the University of Glasgow. Phonetics has a long history at Glasgow, beginning formally with Charles Martin who taught phonetics in the French department from 1907, but acknowledged before then in the honorary degree awarded by the University of Glasgow in 1892 to the distinguished philologist – and phonetician – Henry Sweet. From the early 1980s, Phonetics moved to English Language, where it is now taught and researched, supported by the facilities and researchers of the *Glasgow University Laboratory of Phonetics* (GULP). Phonetics contributes to teaching and research in English Language, English and Scottish Literature, which receives very high levels of student satisfaction, and which has been recognized in research assessments as world-leading and internationally excellent. Phonetics is a key part of the undergraduate curriculum in other areas too, including Celtic and Gaelic. Phonetic research at Glasgow, which has strong links with Celtic and Gaelic, Psychology and Computing Science, reflects strong theoretical interests in the role of social, indexical and psychological factors in relation to phonetics. In recent years, this research has been recognized through major university investments such as the upgrading and expansion of the Laboratory, and by a series of major grants from funders such as the AHRC, the ESRC, the Leverhulme and Carnegie Trusts. I am delighted that my colleagues at Glasgow have joined forces with our neighbouring institutions in Scotland to host ICPhS 2015. I very much hope that you enjoy your time in Glasgow, ‘the friendliest city in the world’ according to *Rough Guides*, and that your own research interests may bring you back to work with our researchers in Phonetics in Glasgow in the future.



Professor Petra Wend PhD FRSA FRSE
Principal and Vice Chancellor



Queen Margaret University
EDINBURGH



Professor Alan Gilloran
Vice Principal-Academic

On behalf of Queen Margaret University, Edinburgh, we are delighted to welcome you all to ICPHS. We would also like to thank our three partner institutions and all the individuals who have put so much hard work into the organisation of this event. The Congress is a fantastic opportunity for academics, students and research users to contribute to and benefit from this broad showcase of excellence at the cutting edge of the phonetic sciences, and now it can begin.

Co-hosting ICPHS is a particular honour for QMU, since we have such a strong focus in this scientific area. Though we are one of the newest universities in Scotland, our phonetic roots reach back to 1946, with the founding of the Edinburgh School of Speech Therapy. Our institutional focus in teaching and learning remains proudly vocational, while our research strategy emphasises both clinically-relevant questions and the development of models and instrumentation relevant to the phonetic sciences as a whole. To find out more about QMU and the Clinical Audiology, Speech and Language (CASL) Research Centre we invite you to visit our academic exhibition here, where you will find information on our research facilities, our recent projects and outputs, and our approach to real-world impact. Together these were rated among the very best in the UK in REF2015. But most importantly, we extend a warm welcome, and not just for this week, but in the hope of interaction and collaboration in the years to come.



Anja Lowit, PhD
Vice-Dean Research & KE,
Faculty of Humanities and Social Sciences

Strathclyde University would like to welcome you warmly to Glasgow. We are proud to co-host the 18th congress of the ICPHS together with our partners of the organising committee, whose varying expertise aptly captures the breadth of the phonetic sciences and the wide ranging impact this discipline can have on society. At Strathclyde we have a long history of applying phonetic principles to the diagnosis and treatment of people with speech disorders, being one of the first speech and language therapy courses to be established in the UK. In addition to providing excellent training to emerging as well as qualified practitioners, we have a strong research profile in clinical and applied phonetics. Our expertise ranges from investigations of normal speech behaviours to build normative databases on the one hand, to trying to better understand disordered behaviours and pioneering new methodologies in a clinical context as a basis for improved patient management on the other. We rank amongst the top UK universities both for our teaching provision as well as our research contribution.

We hope that you will enjoy your time in Glasgow and that ICPHS will be a thought provoking and stimulating event that will allow you to strengthen existing and build new links with colleagues, and we would be delighted to welcome some of you back here in future to work with us.

Organization

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International Phonetic Association (IPA)

The International Phonetic Association (IPA) is the major as well as the oldest representative organisation for phoneticians. It was established in 1886 in Paris. 2011 marked the 125th anniversary of the founding of the IPA, and 2013 marked the 125th anniversary of the first publication of the International Phonetic Alphabet and the formulation of the principles. The aim of the IPA is to promote the scientific study of phonetics and the various practical applications of that science. In furtherance of this aim, the IPA provides the academic community world-wide with a notational standard for the phonetic representation of all languages - the International Phonetic Alphabet (also IPA). The latest version of the IPA Alphabet was published in 2005.

The IPA also sponsors the International Congresses of Phonetic Sciences, and, through Cambridge University Press, publishes the Journal of the International Phonetic Association three times a year, to which members of the IPA have free online access.

Website: <https://www.internationalphoneticassociation.org>

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Eleonora Albano	Jens Edlund	Raymond Kent
Bistra Andreeva	Gorka Elordieta	Gerrit Kentner
Katsura Aoyama	Mirjam Ernestus	Ghada Khattab
Diana Archangeli	Daniel Ezra Johnson	Jeesun Kim
Amalia Arvaniti	Anne Fabricius	James Kirby
Molly Babel	Zsuzsanna Fagyal	Christin Kirchhuebel
Martin Ball	Janet Fletcher	Felicitas Kleber
Will Barras	Caroline Floccia	Rachael-Anne Knight
Bill Barry	Julia Forsberg	Alexei Kochetov
Stefan Baumann	Joe Fruehwald	Marie-José Kolly
Janet Beck	Susanne Fuchs	Bernd Kröger
Catherine Best	Christian Geng	Jianjing Kuang
Juliette Blevins	Anja Geumann	Haruo Kubozono
Bettina Braun	Salem Ghazali	Frank Kügler
Susanne Brouwer	Bryan Gick	Carmen Kung
Alejna Brugos	Matthew Gordon	Emina Kurtic
Marc Brunelle	Björn Granström	Bob Ladd
Andy Butcher	Nina Grønnum	Aditi Lahiri
Dani Byrd	Stella Gryllia	Daniel Lawrence
Joao Cabral	John Hajek	Eleanor Lawson
Tina Cambier-Langeveld	Helen Hanson	Alice Lee
Kathryn Campbell-Kibler	Mark Hasegawa-Johnson	Wai-Sum Lee
Rolf Carlson	Jen Hay	Angelos Lengeris
Katie Carmichael	Antje Heinrich	Marko Liker
Ioana Chitoran	Sam Hellmuth	Susan Lin
Taehong Cho	Anne Hermes	Julie Liss
Valter Ciocca	Ingo Hertrich	Rachel Macdonald
Wendy Cohen	Barry Heselwood	Mike MacMahon
Jennifer Cole	Nikolaus Himmelmann	Sandra Madureira
Martin Corley	Julia Hirschberg	Katalin Mády
Alexander Coupe	Philip Hoole	James Mahshie
Felicity Cox	David House	Tareq Maiteq
Kathleen Currie Hall	Sara Howard	Giovanna Marotta
Alexandra D'Arcy	Mark Huckvale	Martine Mazaudon
Chris Davis	Stefanie Jannedy	Kevin McGowan
Bart de Boer	Hae-Sung Jeon	James McQueen
Esther de Leeuw	Matthias Jilka	Lucie Ménard
Donald Derrick	Elizabeth Johnson	Ineke Mennen
Laura Dilley	Allard Jongman	Alexis Michaud
Snezhina Dimitrova	Brian Jose	Holger Mitterer
Mariapaola D'Imperio	Sun-Ah Jun	Bernd Möbius
Aaron Dinkin	Evia Kainada	Scott Moisik
Ellen Douglas-Cowie	Jonathan Kasstan	Peggy Mok

Geoffrey Morrison	Erich Round	Chiu-yu Tseng
Doris Muecke	Felix Schaeffler	Alice Turk
Benjamin Munson	James M. Scobbie	Christiane Ulbrich
James Myers	Koen Sebregts	Martti Vainio
Scott Myers	Joan Sereno	Jan van Doorn
Naomi Nagy	Stefanie Shattuck-Hufnagel	Vincent van Heuven
Satsuki Nakai	Jason Shaw	Lieke van Maastricht
Claire Nance	Ryan Shosted	Eric Vatikiotis-Bateson
Terrance Nearey	Juraj Šimko	Béatrice Vaxelaire
Manwa Lawrence Ng	Adrian Simpson	Nanette Veilleux
Ailbhe Ní Chasaide	Rudolph Sock	Petra Wagner
Katerina Nicolaidis	Anja Staiger	Abby Walker
Oliver Niebuhr	Ingmar Steiner	Paul Warren
Nancy Niedzielski	Carol Stoel-Gammon	Kevin Watson
Jennifer Nycz	Vesna Stojanovik	Dominic Watt
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Marianne Pouplier	Ryan Sullivant	Nicole Whitworth
Tamara Rathcke	Anita Szakay	Ian Wilson
Uwe Reichel	Meredith Tamminga	Matthias Wolff
Eva Reinisch	Ros Temple	Alan Yu
Peggy Renwick	Louis ten Bosch	Kristine Yu
Korin Richmond	Hayo Terband	Wolfram Ziegler
Timo Roettger	Jürgen Trouvain	Marzena Žygis

Stage II Reviewers

Mary E. Beckman	Fiona Gibbon	Jane Setter
Ocke-Schwen Bohn	Carlos Gussenhoven	Marc Swerts
Ann Bradlow	Valerie Hazan	Marilyn Vihman
Kenneth J. de Jong	Paul Iverson	Douglas H. Whalen
Gerard J. Docherty	John Kingston	Maria Wolters
John Esling	Anders Löfqvist	Yi Xu
Cécile Fougeron	Francis Nolan	
Paul Foulkes	Daniel Recasens	

Brief outline of review process

We adopted a two-stage review process. At Stage 1, each reviewer read 8-10 papers, and rated them under each of five general headings (Interest, Scholarship, Method, Clarity, and English/Expression, and Overall Impression). Reviewers were encouraged, but not required, to provide written comments. At Stage 2, an expert panel of mostly senior reviewers considered the Stage 1 reviews for roughly 40-50 papers in their broad field of expertise and made final recommendations about acceptance or rejection. Stage 2 reviewers were asked to focus on borderline cases and cases where the Stage 1 reviewers were in clear disagreement. Our final acceptance rate was 85%.

Statistics

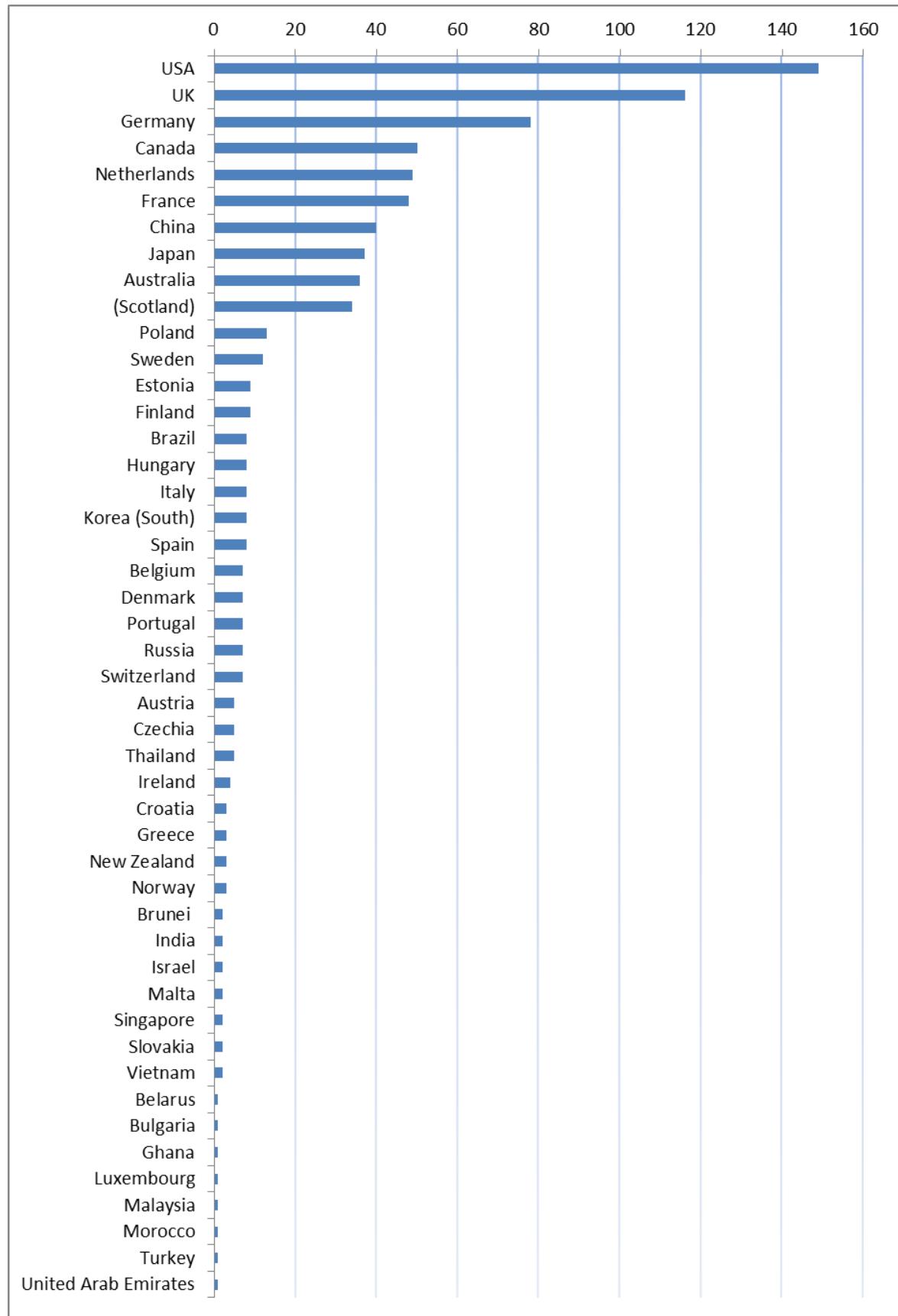
Number of papers for the ICPHS XVIII

Sessions	Number	Papers
Plenary Lectures	4	4
Parallel Sessions	13	345
Discussant Sessions	10	50
Poster Sessions	7	375
TOTAL	34	774

Number of contributions per country

(according to affiliation of corresponding authors as at 15 June 2015)

Australia	36	Japan	37
Austria	5	Korea (South)	8
Belarus	1	Luxembourg	1
Belgium	7	Malaysia	1
Brazil	8	Malta	2
Brunei	2	Morocco	1
Bulgaria	1	Netherlands	49
Canada	50	New Zealand	3
China	40	Norway	3
Croatia	3	Poland	13
Czechia	5	Portugal	7
Denmark	7	Russia	7
Estonia	9	Singapore	2
Finland	9	Slovakia	2
France	48	Spain	8
Germany	78	Sweden	12
Ghana	1	Switzerland	7
Greece	3	Thailand	5
Hungary	8	Turkey	1
India	2	United Arab Emirates	1
Ireland	4	USA	149
Israel	2	UK (Scotland 34)	116
Italy	8	Vietnam	2



IPA Awards

Recipients of IPA Student Awards

Hye-young Bang (<i>Canada</i>)	Christina Otto (<i>Germany</i>)
Anastasia Chionidou (<i>Greece</i>)	Maida Percival (<i>Canada</i>)
Mirjam de Jonge (<i>Netherlands</i>)	Page Piccinini (<i>USA</i>)
Eleanor Drake (<i>UK</i>)	Amanda Ritchart (<i>USA</i>)
Luke Galea (<i>Germany</i>)	Timo Roettger (<i>Germany</i>)
Tyler Heston (<i>USA</i>)	Scott Seyfarth (<i>USA</i>)
Shiori Ikawa (<i>Japan</i>)	Stavroula Sotiropoulou (<i>Germany</i>)
Anna Jespersen (<i>UK</i>)	Taja Stoll (<i>Germany</i>)
Oriana Kilbourn-Ceron (<i>Canada</i>)	James Tanner (<i>Canada</i>)
Yoonjeong Lee (<i>USA</i>)	Rory Turnbull (<i>USA</i>)
Michael McAuliffe (<i>Canada</i>)	Shufang Xy (<i>Brunei</i>)

Recipients of Gösta Bruce Scholarships for ICPHS 2015

Ann Aly (<i>USA</i>)	Martin Kohlberger (<i>Netherlands</i>)
Helena Beeley (<i>UK</i>)	Eleanor Lewis (<i>Australia</i>)
Yifei Bi (<i>Netherlands</i>)	Miguel Llompart-Garcia (<i>USA</i>)
Tingting Brengelmann (<i>Germany</i>)	Henrik Niemann (<i>Germany</i>)
Ricky KW Chan (<i>Hong Kong</i>)	Kimmo Peltola (<i>Finland</i>)
Una Chow (<i>Canada</i>)	Rebekka Puderbaugh (<i>Canada</i>)
Matthias Franken (<i>Netherlands</i>)	Zhen Qin (<i>USA</i>)
Sarah Hamilton (<i>USA</i>)	Mitko Sabev (<i>United Kingdom</i>)
Jonathan Havenhill (<i>USA</i>)	Amos Teo (<i>USA</i>)
Qandeel Hussain (<i>Australia</i>)	Andreas Windmann (<i>Germany</i>)

Acknowledgements

Organizing ICPHS 2015 has been a substantial undertaking, which would not have been possible without the help and support of numerous people. In particular, we would like to thank:

- The members of the Local Organizing Committee who attended meetings and contributed to online discussions, and specifically: Bob Ladd and Alice Turk (paper submission and review); Maria Wolters and Rachel Smith (programme); Maria Wolters and Mike MacMahon (abstract book); Bert Remijsen and Pavel Iosad (discussant sessions); Lauren Hall Lew and Claire Timmins (social media); Jim Scobbie and Joe Fruehwald (sponsorship); Felix Schaeffler and Pat Strycharczuk (volunteers); Pat Strycharczuk and Janet Beck (social programme)
- Our authors for submitting papers and contributing to an excellent programme
- All our reviewers for the swift turnabout for the Stage 1 and Stage 2 review process
- Our Glasgow University Postgraduate Intern, Emma Osborne
- Glasgow City Marketing Bureau, and especially Beverley MacLean, Aileen Crawford and Evie Mauchan, who were so helpful in the early stages of the bid process, and close to the conference itself
- the Scottish Exhibition Conference Centre, and especially Dawn Walker and Lynne Guthrie
- Our friends, colleagues and management at our local institutions
- Our enthusiastic group of student volunteers drawn from Glasgow and Edinburgh, from all four institutions
- John Ohala for the display of the obituaries for the phoneticians who passed away recently
- And most especially, our Professional Congress Organizer, Intelligent Events, Celia Lloyd, Judy Livingstone, Claire McLaughlin, and Bernie Beattie, who have helped us from start to finish, and without whom this conference simply would not have been possible.

ICPhS Satellite Meetings

Saturday 8 – Sunday 9 August 2015

DiSS 2015. Disfluency in Spontaneous Speech

Robin Lickley (Queen Margaret University)

Website: http://www.disfluency.org/DiSS_2015/DiSS_2015_home.html

Wednesday 12 August 2015

Building speaker-specific biomechanical tongue models: A practical guide

Susanne Fuchs, (ZAS Berlin)

Ralf Winkler (ZAS Berlin)

Pascal Perrier (GIPSA-lab Grenoble)

Lasse Bombien (USC Los Angeles)

Website: <http://www.icphs2015.info/upldrctry/TongueModels.pdf>

The evolution of phonetic capabilities: causes, constraints and consequences

Hannah Little

Bart de Boer

Website: <https://ai.vub.ac.be/ICPhS>

Workshop on Developing an International Prosodic Alphabet (IPrA) within the AM framework

Sun-Ah Jun (University of California Los Angeles)

José Hualde (University of Illinois at Champaign-Urbana)

Pilar Prieto (ICREA-Universitat Pompeu Fabra)

Website: http://www.linguistics.ucla.edu/ipra_workshop/index.html

Workshop on Phonetic Learner Corpora

Jürgen Trouvain (Saarland University, Saarbrücken)

Frank Zimmerer (Saarland University, Saarbrücken)

Mária Gósy (Hungarian Academy of Sciences, Budapest)

Anne Bonneau (LORIA, Nancy)

Website: <http://www.ifcasl.org/workshop.html>

Workshop on Geminate Consonants across the World

Haruo Kubozono (National Institute for Japanese Language and Linguistics)

Shigeto Kawahara (Keio University)

Rachid Ridouane (CNRS/Sorbonne Nouvelle)

Website: http://pj.ninjal.ac.jp/phonology/IntlConference/gemcon_2015/010home_1/

Articulography: Practical use and exchange of experiences

Ulrich Szagun

Website: <http://www.articulograph.de/?p=1384>

Singing in Tone

James Kirby

Bob Ladd

Website: <http://www.lel.ed.ac.uk/~jkirby/song/>

Exhibition

Academic Exhibitors

Adam Mickiewicz University in Poznań

Phonetics, Phonology, Linguistics in Poznań

Website: <http://wa.amu.edu.pl/wa>

The AMU Faculty of English (Wydział Anglistyki, WA) is the largest centre of English studies not only in Poland but also in Europe. It has a long history, rich teaching experience, as well as numerous achievements in research both in Poland and abroad. This exhibition presents the Faculty's activities from two core perspectives: research- and teaching-oriented. In terms of research, we will show the broad scope of topics being investigated within the projects run at WA, including but not limited to phonetics and phonology. We will also present the research facilities available at the Faculty. In terms of teaching, the Faculty offers an intensive programme which involves practical training as well as theoretical courses in English phonetics and phonology. This programme is supported by a number of aids developed by Faculty members which facilitate the process of the acquisition of English pronunciation by Polish and foreign students. The programme as well as all the available aids will be presented at the stand.

Haskins Laboratories Inc.

Website: <http://www.haskins.yale.edu>

Speech Research Opportunities at Haskins Laboratories, New Haven, Connecticut, USA. Speech research has a long, distinguished and continuing tradition at Haskins Laboratories, an independent, multi-disciplinary laboratory located in New Haven, Connecticut, USA. Affiliated with Yale University and the University of Connecticut, Haskins is supported largely by research grants from the US National Institutes of Health, the National Science Foundation, and other funders.

Research topics cover a wide array in speech production and perception, including motor control, neural correlates of perception, dynamics of speech and speech accompanying gestures, numerical modelling of prosody, acoustic analysis of laboratory and spontaneous speech, and many more.

Our researchers come from many institutions, primarily academic programs in linguistics, psychology and speech science, as well as full-time researchers supported by grant funds. Various avenues for joining our research exist. For those wishing to pursue a Ph.D., consider applying to one of our affiliated universities (the two mentioned above plus the Graduate Center of the City University of New York) in linguistics, psychology, or speech science. Paid post-doctoral positions are announced on our website (<http://www.haskins.yale.edu/jobs.html>). Unpaid, temporary visits or internships can be arranged in most cases. And senior researchers can explore the possibility of applying for grant support through Haskins.

Our facilities include a research library, recording studio, an anechoic chamber, and dedicated data collection areas supporting such devices as electromagnetic articulometry (EMA), ultrasound, motion capture (Optotrak and Vicon), electroglottography (EGG), air pressure measurement, electroencephalography (EEG), eye-tracking, and near-infrared spectroscopy (NIRS), together with functional magnetic resonance imaging (fMRI) at the neighboring Yale/New Haven Hospital. Many of these systems can function together to allow measures of multiple aspects of speech simultaneously.

Please contact Doug Whalen (whalen@haskins.yale.edu) for more information.

Newcastle University

Looking for taught Doctoral Programmes in the UK? Have a look at our new IPhD programmes in Phonetics and Phonology, Applied Linguistics, and English Language and Linguistics.

This exhibition aims to showcase the range of postgraduate programmes in the areas of Speech and Language Sciences, Applied Linguistics and Theoretical Linguistics at Newcastle University. Of particular interest to ICPhS participants will be the new Integrated PhD (IPhD) programmes which are available in this area, including the IPhD in Phonetics and Phonology, the IPhD in Applied Linguistics, and the IPhD in English Language and Linguistics. We also have a range of other postgraduate programmes in Speech and Language Pathology (including MSc and CPD courses), Linguistics, TESOL and Cross-cultural Communication.

Queen Margaret University

SHS: Speech and Hearing Sciences

CASL: Clinical Audiology, Speech and Language Research Centre

www.qmu.ac.uk/casl

QMU achieved University title in 2007, but our phonetic research goes back many decades, and is firmly shaped by the vocational heritage of the institution, which itself has roots that stretch back over 125 years. We are here at ICPhS to highlight (a) our clinical and research degree programmes aimed at graduates from delegates' own universities, and (b) the opportunities for research collaboration. We are located in Edinburgh, a world centre for phonetics research. In the recent Research Excellence Framework, QMU's overall research profile was rated in the top half dozen of the UK's Linguistics research groupings.

Vocational programmes: As well as an undergraduate (four year) clinical programme in Speech and Language Therapy, we offer independent M-level clinical curricula for graduates wishing to obtain a professional qualification at Masters level in either Speech and Language Therapy, or Audiology. Graduates from any discipline can study towards a clinical PGDip/MSc (the latter requires a research thesis): but of course we particularly welcome graduates with a 2(1) or a first-class degree in Linguistics, Phonetics, Psychology, or related disciplines.

Research degrees: We offer PhD, Prof Doc and MRes, which are open to applicants from any relevant discipline, clinical or non-clinical, who wish to take advantage of our specialisms. Full training in articulatory phonetics or voice, for example, is available in the CASL laboratories. We have a small, successful group of PhD students, and joint registration with other Scottish universities may be available under, for example, the Scottish Graduate School of Social Sciences.

Collaborative research: We welcome approaches from independent researchers and other institutions. Our research staff have a firm track record of successful external research collaborations, and we are delighted to host independently-funded post-doctoral research fellows wishing to broaden and deepen their research skills. Of particular relevance to delegates at ICPhS are the opportunities for advanced training, networking, and gaining experience and opportunities using a range of methods such as: articulatory phonetics (EPG, MRI, EMA, UTI), voice analysis, sociophonetics, acoustic analysis, laboratory phonology, acquisition, vocal profile analysis, psycholinguistics. Proposals are very welcome in any theoretical areas of the phonetic sciences in which our staff have research interests. See our range of papers here at ICPhS, and the CASL website & Facebook feed.

Stockholm University

Interspeech 2017

20-24 August 2017, Stockholm, Sweden

Interspeech 2017 will be held at the Stockholm University's campus, in August 20-24, 2017.

Interspeech 2017 is organized by Stockholm University, KTH (Royal Institute of Technology) and Karolinska Institute, with the support of other Scandinavian universities. Further information available at www.interspeech2017.org.

Information on Interspeech 2017 and an overview of research themes on speech and speech communication currently being pursued at Stockholm University, KTH, Karolinska Institute and other Swedish research groups will be available in this academic exhibit.

Welcome to Interspeech 2017!

Seeing Speech and Dynamic Dialects

University of Glasgow, Queen Margaret University, University College London

An exhibition of two articulatory speech resources for Phonetics teaching (www.seeingspeech.ac.uk) and world-wide English accent variation (www.dynamicdialects.ac.uk). We will be on hand to demonstrate the Web resources; discuss how they were created and how they can be used in Phonetics teaching and accent study. We will also have a hands-on demonstration of ultrasound tongue imaging.

UCL (University College London)

Speech Hearing and Phonetic Sciences at UCL

Website: <http://www.ucl.ac.uk/pals/research/shaps>

The Department of Phonetics at UCL was established in 1912. Just over 100 years on, we will present an overview of current research in the Department of Speech Hearing and Phonetic Sciences (SHaPS) as well as some demonstrations of current work. We will also introduce our Masters and PhD programs in Language Sciences.

Publishers

Cambridge University Press

<http://journals.cambridge.org/action/displayJournal?jid=IPA>

De Gruyter Mouton

<http://www.degruyter.com/page/448>

S Karger AG

<http://www.karger.com/>

Edinburgh University Press

<http://www.euppublishing.com/>

LINCOM

<http://www.lincom.eu/>

Commercial Exhibitors

Articulate Instruments Ltd

<http://www.articulateinstruments.com/>

Carstens Medizinelektronik GmbH

Articulograph AG501

<http://www.articulograph.de/>

NDI (Northern Digital Inc.)

http://www.ndigital.com/msci/applications/speech_research



General Information

Badges

For your own security, it is mandatory for all participants to wear their badge visibly throughout the meeting as it is the entrance ticket to all sessions. In the event of losing your own badge, or if you have any concerns over unidentified people in the venue, please contact the registration desk.

Certificate of Attendance

A certificate of attendance will be handed out with your Congress documents.

WiFi

The internet can be accessed wirelessly for light web browsing and access to emails. Please make other arrangements for large file transfer or streaming. The login details are:

Username: ICPHS2015

Password: Phonetics

Coffee breaks

Refreshments will be available for registered participants and accompanying guests during the designated coffee break times in Halls 1 and 2.

Lunches

In your delegate pack are 4 lunch vouchers. These can be used on any conference day at any of the catering outlets in the SECC. There are various ‘meal deals’ that offer hot or cold food and a drink to the value of your voucher.

Conference Language

The conference language is English.

Conference Venue and Postal Address

SECC, Exhibition Way, Glasgow G3 8YW

Facilities: Banking facilities, business and information centre, medical centre and shop.

See also <http://secc.co.uk/attend.aspx>

Conference Office/Registration Hall 1

Opening hours:

Sunday 9 August: 13:00-18:00

Monday 10 August: 08:00-18:00

Tuesday 11 August: 08:00-18:00

Wednesday 12 August: 08:00-14:00

Thursday 13 August: 08:00-18:00

Friday 14 August: 08:00-18:00

Liability

The organisers cannot be held responsible for any personal injury, accident, damage to private property or additional expenses incurred as a result of changes of dates, venue, programme or otherwise. It is recommended that you take out your own travel insurance.

Photographing/Recording

We strongly advise that you obtain permission from the presenters before taking pictures or video/audio recordings of presentations, posters, or other academic aspects of sessions. This is especially the case for anything intended for online distribution. All oral and poster presentations will be available as open access publications in the proceedings.

Live Tweeting

We encourage live tweeting about #icphs2015 and would like specified volunteers for each session. (Note that ideal live tweeting makes clear who the speaker is, uses their handle if possible, and uses quotation marks for direct quotations.) If you would like to volunteer, contact us at @icphs2015 or tinyurl.com/oht4edp.

Poster Exhibition

Scientific posters are exhibited in the poster area in Hall 1.

Oral Presentations

A preview centre for viewing your presentation is located in Etive.

The oral paper time slot is 15 minutes, which is divided as follows:

- 10 minutes talk
- 3 minutes questions
- 2 minutes changing time

There is no difference in the length of the slots between a 3-paper and a 4-paper session. We strongly advise that you rehearse your talk in advance to ensure that it is only 10 minutes long, by using a timer or the 'rehearse timings' tool in powerpoint (under 'slide show'). You may display the timer option during your presentation.

Speakers are required to load their powerpoint presentation to the SECC presentation system before their session. Speakers are requested to identify themselves as speakers to the registration staff well in advance, and **by the break before your session at the very latest**. A member of staff will then direct you to the speaker preview room (Etive) to load your presentation. Speakers can also go directly to the preview room, located in Etive. Reviewing your presentation will be your final opportunity to identify any errors in your slides. There will be Audiovisual Technicians on hand to help speakers load and test their presentations in Etive.

Social Programme

Welcome Reception

Monday 10 August 2015 6.15pm until 8pm



All registered participants and registered accompanying guests are warmly welcome to join the welcome drinks reception at Glasgow Science Centre on Monday 10 August (access is with your conference badge).

Glasgow Science Centre is one of Scotland's must-see visitor attractions and there are loads of things to see and do! www.glasgowsciencecentre.org

The Centre is home to hundreds of interactive exhibits – why not let your imagination run wild in our Be Creative, Be Innovative zone on Floor 2; and on Floor 1, be captivated by the hugely popular classics like the plasma ball, chaos pendulums and whispering dishes... Little Explorers can even take the helm of our ship on the Big Explorer!

Conference Party

Thursday 13 August 2015 6.15pm until Midnight

The conference party will be held in the indoor courtyard of the historic Merchant Square, Glasgow. Pre-booked tickets will be handed out with your registration pack. On-site bookings are subject to availability. Please note that whilst families are very welcome, Glasgow has strict alcohol licencing laws, and children (under 18s) will not be allowed in the bar areas after 10pm though they will be permitted in the central dance area.



Once part of the old Glasgow Fruit Market, Merchant Square is imbued with the history of the area's dominating Victorian architecture. Today this sense of history blends seamlessly with the distinctly cosmopolitan ambiance that pervades the surrounding cobbled streets.

Canapé starters will be offered and then guests can choose from a selection of restaurants for their main course. The cuisines of many different countries are represented here. For example, Arisaig and Metropolitan serve Scottish cuisine; Fanelli's serve Italian antipasti and other Italian staples; Mercado offer their Spanish tapas etc.



The evening will be complemented with a traditional Scottish ceilidh (Scottish dancing) followed by a disco.

Plenary Lectures

Plenary Lecture 1

Monday, August 10, 2015, 09:30–10:30, Clyde Auditorium

Chair: Alice Turk

The relation between language users' perception and production repertoires

Patrice Speeter Beddar

The relation between speech production and perception is a foundational issue for phonetic theories. Some theorists argue for parity between the forms of speaking and listening, and consequently postulate a tight production-perception link. There are also many approaches in which the postulated close relation is not limited to the requirement of sufficient similarity between signals produced by speakers and received by listeners, but extends to the production-perception relation for the individual language user. These approaches include most exemplar models, as well as some models of sound change. For example, current experimental studies of sound change investigate how phonetic variants in the ambient language serve as a source of new sound patterns that spread through a speech community. Approaches in which listeners' selective attention to certain variants is argued to contribute to change assume, either explicitly or tacitly, that the variants that are particularly salient in perception will be manifested in the listener-turned-speaker's subsequent productions.

The research program described in this talk is guided by the hypothesis that a language user's perception and production repertoires, or grammars, are complexly related in ways mediated by phonetic and non-phonetic (phonological, socio-cognitive, other) factors. Within this broad program, a specific aim to date has been to test whether language users who produce more innovative variants also weight the innovative property more heavily in perception.

This work is illustrated through two collaborative projects. One set of studies investigates, for relatively stable patterns of variation such as anticipatory nasalization in American English, the relation between a listener's dynamic use of coarticulatory information (measured using a visual world eye-tracking paradigm) and that language user's own coarticulated productions. In this project, my collaborators and I investigate whether listeners who systematically use vowel nasalization (arguably, the innovative property) to anticipate an upcoming nasal consonant—that is, those listeners who give strong perceptual weight to the coarticulatory information—are also the participants who produce particularly extensive anticipatory nasalization. A second research strand explores the production-perception relation for sound changes in progress; this work includes study of an emerging tonal contrast, which is replacing earlier voiced-voiceless stop distinctions, in Afrikaans. The Afrikaans project tests whether participants who consistently produce either the conservative (prevoicing) or innovative (post-stop f0) property when differentiating phonological voiced from voiceless stops also rely heavily on that property in their perceptual judgments of stops.

Results of these studies of stable variation and of sound change in progress provide some support for a link between a language user's perceptual weightings and that user's productions, suggesting that this is a fruitful framework to pursue. However, the data also point, unsurprisingly, toward greater malleability in perception than production: in our data, although consistent producers of a target property tend to rely on that property in perception, reliable and attentive perceivers need not be consistent producers. Ongoing work further explores these production-perception differences in malleability; my collaborators and I are also in the early stages of studying the influences of the social indexing of innovative phonetic properties on the perception-production relation.

Plenary Lecture 2*Monday, August 10, 2015, 11:30–12:30, Clyde Auditorium**Chair: John Coleman***Big issues in speech perception: Abstraction and nativeness**

Anne Cutler

Research in the phonetic sciences involves some of the most fundamental questions at issue in the study of language structure and processing. One concerns the ability of language users (and learners) to derive and exploit generalisations abstracted from their linguistic experience. In speech comprehension, a long line of research on adaptation (across talkers, across varieties of a language, to phonetic variability of different kinds, to disadvantageous listening conditions) has revealed significant roles for veridical (episodic) memory and for decision-making based on analogical comparison. This evidence may seem to reduce the necessity for abstraction; yet it is in these very areas that there is also abundant empirical evidence (old and brand new) for listener recourse to abstract knowledge.

The abstraction issue is not unrelated to the question of how we interpret the many advantages enjoyed by the native language in typical listening situations. All users of a second language, for example, are familiar with the greater difficulty arising from listening under adverse conditions (reverberant spaces, background noise, unfamiliar varieties) in an L2 rather than an L1 context. Likewise the adaptability of listening (under all the circumstances listed above) can often seem to be compromised in an L2 compared to the experience with the native language. New relevant evidence on these issues has emerged from cases where the question of nativeness is actually at issue, such as lost, abandoned or neglected first languages. Here too it seems that a full account of the data is facilitated by including both abstract knowledge and accrued experience as explanatory constructs.

Plenary Lecture 3*Friday, August 14, 2015, 14:00–15:00, Lomond Auditorium**Chair: Bob Ladd***The neural control of speech: From computational modeling to neural prosthesis**

Frank H. Guenther

Speech production is a highly complex sensorimotor task involving tightly coordinated processing in the frontal, temporal, and parietal lobes of the cerebral cortex as well as subcortical structures such as the basal ganglia, cerebellum, and thalamus. To better understand these processes, our laboratory has designed, experimentally tested, and iteratively refined a neural network model whose components correspond to the brain regions involved in speech, the Directions Into Velocities of Articulators (DIVA) model. Babbling and imitation phases are used to train neural mappings between phonological, articulatory, auditory, and somatosensory representations. After the imitation phase, the model can produce learned phonemes and syllables by generating movements of an articulatory synthesizer. The model's components correspond to neural populations and are given precise anatomical locations. This allows activity in the model's neurons to be compared directly to neuroimaging data. Computer simulations of the model account for a wide range of experimental findings, including data on acquisition of speaking skills, articulatory kinematics, and brain activity during normal and perturbed speech.

The proliferation of neuroimaging data in the past quarter century has provided a wealth of information regarding the neural mechanisms of speech in neurotypical individuals, as well as neural anomalies that accompany speech disorders. The DIVA model provides a neural and computational framework for interpreting these findings. Simulations of damaged versions of the model generate predictions that can be tested in behavioral and neuroimaging experiments, allowing quantitative comparisons between competing accounts of a disorder. Such simulations also provide a means for distinguishing primary deficits from secondary or compensatory effects. The model has also been used to guide development of a brain-computer interface aimed at restoring speech output to an individual suffering from locked-in syndrome, characterized by complete paralysis with intact sensation and cognition.

In recent years, additional computational models of the neural basis of speech production have arisen in the literature. Future studies that test between these accounts will lead the field toward an ever-refined understanding of the neural underpinnings of speech and its disorders. This in turn will foster the development of treatments that either normalize neural function or make optimal use of unimpaired neural circuitry.

Plenary Lecture 4

*Friday, August 14, 2015, 16:30–17:30, Lomond Auditorium
Chair: Jonathan Harrington*

What speech synthesis can do for you (and what you can do for speech synthesis)

Simon King

Quite remarkable progress has been made in just the last few years, improving both the naturalness and intelligibility of synthetic speech generated from text. Routinely, synthetic speech is now found to be as intelligible as natural speech in quiet conditions, and sometimes also in noise. These dramatic quality improvements suggest that it would be a good time to revisit the use of synthetic speech for speech science, and particularly for investigating speech perception. In this talk, I will provide a brief tutorial on the latest approaches to speech synthesis, including lots of examples of state-of-the-art systems. Then, I will show how this technology can be made controllable, and so used to generate experimental stimuli.

But all of this progress still hasn't delivered completely natural synthetic speech. Synthetic speech is in fact never judged to be as natural as the real thing by listeners. So, what can we do about this? I will outline some of the key remaining problems in speech synthesis, affecting both segmental and supra-segmental naturalness, and suggest ways in which you might be able to help. Can we together discover exactly what is still unnatural about synthetic speech?

The companion paper provides some readings covering the key component technologies of modern speech synthesisers, and suggests a few ways in which they might be useful as experimental tools.

Discussant Sessions

For ICPhS 2015, we introduced a new format to replace the traditional Special Sessions. Our Discussant Sessions provide leading scholars, selected by the broader community, with the opportunity to share their thinking on the state of the art in their subfields, using a set of submitted papers as the basis for the discussion.

We solicited recommendations from the phonetics community in the spring of 2014. The call yielded 135 recommendations, and we were able to secure the agreement from ten discussants. Submitting authors were able to indicate if they wished their paper to be considered by a discussant. The discussants themselves then examined the accepted papers in their area to determine the make-up of the session. They also provided a brief introduction outlining the contents and rationale for each session.

There are two slots in the programme for the Discussant Sessions: in the afternoon on Monday and in the morning on Friday, with five sessions in each slot. Each session will be prefaced by a 15-minute introduction by the discussant, followed by the session papers and general discussion. We would like to thank the discussants and everyone who provided suggestions for their contribution, and hope the new format will be a success!

Discussant Session 1

D1.1: Phonation and Voice Quality

Christian DiCanio

*Monday, August 10, 2015, 16:40–16:55 (followed by papers and general discussion 16:55–18:10),
Caron*

Chair: Bert Remijsen

One of the most intriguing aspects of phonetic science is the number of distinguishable layers within the speech signal. Within even a single segment, such as a vowel, speakers control vowel quality, duration, F0, speech style, and so forth. Listeners, in turn, have learned to pay attention to these different acoustic layers in order to extract meaningful information from the speech signal. Phonation type is one of these important layers. There has been significant progress in our understanding of phonation and voice quality over the past twenty years. This is attributable both to increased interest in speech prosody at lexical and higher level domains and to recent advances in the articulatory and acoustic analysis of voice quality. At the word level, languages may use phonation type to mark meaningful lexical-phonological contrasts (see Gordon and Ladefoged (2001); Edmondson and Esling (2006); DiCanio (2009); Esposito (2010); Garellek and Keating (2011), among others). At higher levels, phonation type may be used to delimit prosodic phrases (see Pierrehumbert and Talkin (1992); Huffman (2005); Garellek (2015), among others). The papers within this session not only highlight the lexical-phonological and prosodic uses of phonation, but also demonstrate novel techniques that are being used to explore its production and perception.

In a study on Shanghai Chinese, Gao and Hallé discuss how breathy phonation is used as a perceptual cue for lower register tones by native listeners. While tones here are distinguished mainly by F0, the authors found that phonation type facilitated perception as a secondary cue. Listeners responded similarly to natural speech

stimuli and to stimuli created using articulatory resynthesis, demonstrating the viability of this approach for research on phonation perception. In a study on Shanghai Wu, Zhang and Yan examine the production and perception of what has been described as a phonation contrast in the language. While they found that speakers more consistently relied on vowel F0 as a cue to this contrast, when the contrast occurs on fricatives, they also relied on spectral tilt. Moreover, when tone sandhi resulted in tonal neutralization, spectral tilt emerged as a stronger cue in production and perception. Their results indicate that the cues to phonation type are multidimensional and weighted differently as a function of context.

With respect to the demarcative uses of phonation type, Bissiri and Zellers examine the degree to which F0 and creaky phonation perceptually integrate for German listeners. When creaky phonation was longer, it was associated with a fall in F0, even when no fall was present. When creaky phonation was shorter, it was more often perceived as marking a word boundary. These results show that the time-course of non-modal phonation type can influence the particular role it plays in a linguistic system. In a study using the Buckeye corpus, Seyfarth and Garellek examine glottal reinforcement of English codas /t/ and /p/. In agreement with previous work, they found that these stops are glottalized more often when they precede sonorants than when they precede other consonants.

One hypothesis for glottal reinforcement is that glottalization serves to enhance voicelessness and prevent coarticulatory voicing from the following segment. After controlling for phrasal position and creak, the authors found that glottal reinforcement was indeed more frequent preceding voiced obstruents than voiceless obstruents, lending support to this hypothesis.

A common thread throughout these papers is the question of how F0 and phonation type cohere in speech production and perception. As Bissiri and Zellers discuss, these layers function independently when glottalization is short, but are integrated when glottalization is longer. Each may cue lexical-prosodic contrasts as well, as shown in Gao & Hallé and Zhang & Yan's work. The papers within this session also reflect novel phonetic methods for the analysis of phonation type. While it is now easier than ever to investigate the production of voice quality (see Shue et al (2009)), articulatory synthesis and large-scale corpus phonetic methods highlight the newer tools that are advancing research not only in this sub-field, but for phonetics as a whole.

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D1.2: Phonetics-phonology interface and laboratory phonology

Katarzyna Dziubalska-Kołaczyk

*Monday, August 10, 2015, 16:40–16:55 (followed by papers and general discussion 16:55–18:10),
Alsh*

Chair: Elinor Payne

In this session we will focus on one aspect of phonetics-phonology interface investigated by laboratory phonology: consonant clusters.

Clusters are described by phonotactics, which determines phonological conditions and constraints on the occurrence or co-occurrence of sounds in a given language (e.g., [pstr-] in Polish *pstrąg* ‘trout’, [-ps] in English *lapse*). Syllables, morphemes or words serve as domains of phonotactics. However, the functions of phonotactics – to achieve easily pronounceable and perceptible sequences – may be distorted by morphology, which predictably leads to phonotactically marked structures. The interaction between phonotactics and morphotactics (e.g., [spstr-] in *z pstrągiem* ‘with a trout’, [-ps] in caps) is referred to as morphonotactics (Dressler and Dziubalska-Kołaczyk 2006), a subfield of morphophonology (cf. Dressler 1985, 1996). Morphonotactics focuses on intermorphemic clusters arising due to morphological operations. Thus, in order to account for consonant clusters, the phonetics-phonology interface needs to be complemented by the phonology-morphology interface. The presentations in the session will be dealing with both interfaces.

Hannah Leykum (Acoustic Research Institute, Austrian Academy of Sciences, Vienna) in “Word-final (mor-)phonotactic consonant clusters in Standard Austrian German” hypothesizes that morphonotactic clusters are more robust and highlighted in speech production than phonotactic clusters. To verify this she goes on to compare high-frequency word-final morphonotactic and phonotactic clusters and 2nd and 3rd person singular endings. She examines the acoustic features of the clusters (duration and intensity) and of the preceding vowel (duration). I would like to draw your attention to the following points of her talk for further discussion: the shape of the carrier phrase, the distinction between nouns, carrying phonotactic clusters vs. verbs, carrying morphonotactic ones, the homophonous ‘hasst’ forms, and the t-deletions in –st vs. –ft clusters.

The other three papers deal with the phonetic aspects of phonotactics and their phonological consequences. Stefania Marin, Marianne Pouplier (Institute of Phonetics and Speech Processing, Ludwig Maximilian University of Munich) and Alexei Kochetov (Department of Linguistics, University of Toronto) in “Timing patterns of word-initial obstruent-sonorant clusters in Russian” explore timing effects in clusters whose C2 is either a nasal or a lateral. In particular, they investigate the nasal vs. lateral effect and the place of articulation effect and their interaction. The issues deserving special attention in the discussion are the language specific aspect of the investigated effects as well as the explanation of those effects by the aerodynamic and perceptual requirements on clusters. A general question concerns the consequences of the above for the phonology of clusters.

The next two papers deal with epenthesis as repair for non-native clusters. In “The influence of preceding consonant on perceptual epenthesis in Japanese” Elisabeth Hume (University of Canterbury) investigates the quality of the illusory vowel perceived by Japanese listeners in illicit consonant sequences. The different ways in which the perceptual epenthesis is shown to work provide an interesting playground for the interaction between universal, phonetically motivated factors and language specific, phonologically motivated ones. A moot point for the discussion would be the question of the priorities, i.e., which factors take precedence and why: cross-linguistic phonetic grounding, statistical patterns or language specific phonotactics? Or is the accumulation of factors decisive?

Transitional vocoids in the production of non-native consonant clusters are also the topic of the fourth presentation in the paper entitled “Acoustic characteristics of open transition in nonnative consonant cluster production”, by Colin Wilson (John Hopkins University). The study identifies several acoustic characteristics that distinguish cases of epenthesis from accurate cluster realizations. It contributes new automatic analytic methods facilitating the investigation of phonotactics.

Notably, the four papers discuss the phonetic or morphonotactic character of clusters without positing any phonological generalizations about the “goodness” of clusters. The question of universal phonotactics remains open.

D1.3: Speech production and articulatory phonetics

Bryan Gick

Monday, August 10, 2015, 16:40–16:55 (followed by papers and general discussion 16:55–18:10),

Clyde Auditorium

Chair: James M. Scobbie

The complementary themes of physical embodiment and environmental embedding, though frequently touted as bases of human cognition, have not been recognized explicitly in models of phonetics. We explore these concepts more fully as they apply to phonetics, seeking a theory based on richer, higher-dimensional models of both the human body and the human environment. In contrast with previous models, we pursue not an inventory of primitive “sounds”, but rather an inventory of highly specialized body structures, each of which is defined according to its specific function at the interface between the physical organism and its richly multisensory interactive environment. Simulations and experiments will be explored with implications relating to these two themes.

While phonetic theories have traditionally made reference to anatomical terms like “lips” and/or derivative features like [labial], such terms have remained physically and neurophysiologically undefined. Using biomechanically realistic models without predefined articulators in the ArtiSynth platform

(www.artisynth.org [e.g., Fels et al. 2003 ICPHS 15. 179–184; Gick et al. 2014 Comp. Meth. Biomech. & Biomed. Eng.: Imag. & Vis. doi: 10.1080/21681163.2013.851627]), simulations and experimental results show that labial speech movements may be viewed as the output of independent neuromuscular “modules” that emerge through use as a learner optimizes the biomechanics of speech production [see Gick & Stavness 2013 Front. Psych.: Cog. Sci. 4, 977]. Embodied modules of this kind constitute a long-sought-after set of discrete and controllable “body parts” our nervous systems can viably define and deploy [e.g., Bizzi & Cheung 2013 Front. Compu. Neurosci. 7: 51]. Such a model offers a real possibility of closing the loop between recently observed speech movement primitives [Ramanarayanan et al. 2013 J. Acoust. Soc. Am. 134. 1378–1394] and newly discovered cortical regions associated with speech production [Bouchard et al.

2013 *Nature* 495, 327–332]. Additional papers [Li, Honda, Wei & Dang; Chiu & Gick] in this session both describe techniques for 3D FEM-based modeling of the lips, with Chiu & Gick additionally reporting an experiment looking at whether speech modules may be decoupled into lower-level primitives using auditory startle.

Embodied neuromuscular primitives for speech cannot exist without being embedded in an interactive environment; that is, the only structures that are expected to emerge are those that are useful (i.e., that provide consistent sensory feedback through use) in the world. Considering sensory feedback, note that the simple act of closing the lips in speech presents both producer and perceiver with a flood of sensory information: auditory, visual, pressure-tactile, aerotactile, proprioceptive, and so on. Consistent with this view, Ghosh et al. [2010 *J. Acoust. Soc. Am.* 128, 3079-3087] show that listeners with higher acuity in either auditory or pressure-tactile perceptual modalities are predictably better at producing an audible contrast between the sibilants ‘s’ and ‘sh’. In the context of the long-standing controversy between articulatory and auditory-perceptual “targets” in speech, a reasonable conclusion is that sibilants occupy both articulatory and auditory-perceptual “target space” [see Perkell 2012 *J. Neuroling.* 25, 382-407]. A still stronger hypothesis could contend that speech draws upon all relevant perceptual modalities, not just articulatory or auditory-acoustic ones, casting speech events in a richly multidimensional space. A follow-up study [Francis et al. 2012 *Can. Acoust.* 40, 22-23] tests this strong hypothesis by extending the Ghosh et al. [2010] approach to include a test of speakers’ acuity in a third dimension – aerotactile [Gick & Derrick 2009, *Nature* 462, 502-504] – by measuring how well speakers can distinguish the sensation of air flow across the tongue. An additional paper [Gluth & Hoole] in this session describes a further extension of this paradigm to include the visual modality. A final paper [Niziolek, Nagarajan & Houde] provides an example of the perception-production loop, at the interface between embodiment and embedding.

D1.4: Sound change and speech evolution

Andrew Wedel

Monday, August 10, 2015, 16:40–16:55 (followed by papers and general discussion 16:55-18:10),

Forth Auditorium

Chair: James Kirby

This discussant section will showcase two facets of the rapidly moving field of sound system evolution: (i) new findings on the bi-directional relationship between sublexical and lexical categories in sound change, and (ii) new methods for obtaining detailed data on individual and group variation over time.

Strictly phonemic models of the lexicon hold that the pronunciation of a phoneme is determined solely by the grammar, not word identity, and therefore predict that sound change should occur in lockstep across the lexicon. Early work on lexical diffusion in the 60s and 70s called the phonemic model into question by suggesting that sound change can proceed at different rates in different words, but lack of data blunted the theoretical impact of these findings. In the last few years, however, new analytic techniques combined with detailed corpus data have allowed researchers to drill down into this issue with a new and exciting degree of control. The first two papers in this session study large datasets and provide strong new evidence for an interaction between representations at the lexical and sublexical levels in sound change.

In their paper ‘Word-level distributions and structural factors co-determine GOOSE-fronting’, Marton Soskuthy and colleagues analyze a corpus of Derby English spanning three generations to investigate the interaction of prevocalic yod and u-fronting in different classes of words. Of central interest are a class of

words in which prevocalic yod, which is a strong conditioning factor for u-fronting, can be optionally dropped (e.g., ‘new’ as [nu] or [nju].) Soskuthy and colleagues find that these optional-yod words show an intermediate degree of u-fronting, which is present even in yod-dropped tokens. These findings are taken to provide evidence for representational coherence at the word level, as well as at the levels of phoneme and allophone.

The process of tonogenesis in Korean is a classic phoneme-split in which the VOT contrast between lax and aspirated stops is collapsing, while a previously allophonic distinction in following vowel F0 is expanding. The work presented by Hye-Young Bang exploits the fact that this process is currently underway to ask whether the collapse in VOT distinctions between lax and aspirated stops precedes, follows, or is simultaneous with the expansion of a F0 distinction in the following vowel, and whether these changes are coordinated at the word level. Using a multi-generational corpus of spoken Korean, loss of contrast in stop VOT is found to occur in tandem with gain of contrast in vowel F0, and these changes are found to be more advanced in more frequent words. These results are interpreted to indicate that these changes are driven by reductive loss of VOT distinctions in frequent words, and that enhancement of F0 occurs adaptively to maintain contrast. Finally, these results are consistent with a role for maintenance of contrast at the level of the word in shaping trajectories of sound change.

A persistent, though steadily improving problem in research on sound change is the difficulty in obtaining detailed data that is both controlled enough for thorough analysis, and natural enough to be trusted as ecologically valid. The second two papers in this session showcase creative exploitation of ‘natural experiments’ and modern analytic techniques to generate detailed information about individual and group-level sound patterns.

The work presented by Alan Yu studies individual and structural factors in variation in anticipatory and carry-over vowel-vowel coarticulation by creating and analyzing a phonetic corpus of the speech of US Supreme Court Justices during oral argument over one year. Analysis of this corpus shows that individual justices are stable in their degree of coarticulation over the course of the year. Additionally, the degree of backness coarticulation is similar between justices. However, there is considerable individual variation in the degree of height coarticulation between justices, suggesting that this type of coarticulation may be under greater phonological, as opposed to general phonetic control.

The work presented by Morgan Sonderegger similarly exploits data available from a socially constrained situation to investigate individual variation over time. The reality show Big Brother UK houses a group of people together for up to three months and records them for broadcast. This work asks whether participants’ patterns in VOT production for voiced and voiceless stops change over the course of days and weeks, whether accommodation effects are apparent. All speakers are found to show daily changes in VOT, while a subset show longer-term trends. Importantly, the finding of inter-day differences in VOT production suggest that studies of individual pronunciation change over longer timescales should take samples over multiple days for each timepoint.

D1.5: Tone and intonation

Yi Xu

Monday, August 10, 2015, 16:40–16:55 (followed by papers and general discussion 16:55–18:10),

Dochart

Chair: Marc Brunelle

Tone and intonation share the common feature of being carried mainly by the fundamental frequency of voice (F0). The ease of obtaining F0 measurements, thanks to the wide availability of software tools and the fact that F0 is largely one-dimensional, have allowed researchers to perform extensive studies on tone and intonation. But ease of observation does not necessarily mean ease of understanding. In fact, the very fact that the same acoustic dimension is involved in both tone and intonation means that their respective contributions to surface F0 contours cannot be easily taken apart [Xu 2004]. Even with regard to intonation alone, there are multiple communicative functions that are co-encoded but hard to disentangle [Hirst 2005]. Furthermore, both tone and intonation are subject to various articulatory mechanisms that all leave indelible marks on the observable surface acoustic patterns [Xu 2005]. Much effort is needed, therefore, to identify the specific communicative functions, their corresponding prosodic properties and the articulatory mechanisms that are behind the surface prosodic patterns. The papers presented in this discussant session all made interesting findings that go toward this goal.

Franich's paper examined the effect of cognitive load on contextual tonal variations. She found that high cognitive load had no effect on carryover assimilatory effect, but increased the amount of anticipatory dissimilation. This is reminiscent of the finding that intrinsic pitch difference between vowels is exaggerated in people who have lost hearing after acquiring speech [Perkell et al. 1992]. Both phenomena suggest that speakers actually make an effort to minimize articulatory effects that increase within-category variance, because the effectiveness of such "normalization" seems to be weaker when they have reduced capacity to monitor the variation due to either loss of hearing or increased cognitive load. My interpretation here, however, is somewhat different from that of Franich's. But such difference could lead to further research on this important issue that so far has attracted little attention.

Teo's paper reports an interesting pattern of tone-intonation interaction. It is found that "in both monosyllabic and disyllabic words, lexical tone is only specified at the left edge of the word, while the right edge of the word is 'free' to take post-lexical intonation tones." The use of a single syllable to carry two consecutive tonal components is especially interesting, but this is not a total stranger to us. It has been observed that an intonational pitch "particle" can be attached to the end of a sentence-final syllable in Mandarin Chinese [Chao 1968, Mueller-Liu 2006, Li et al. 2012] and Cantonese [Wu 2009]. It is also reminiscent of the notion of boundary tone being attached to the end of a phrase accent in the Autosegmental-Metrical (AM) theory of intonation [Pierrehumbert 1980]. Systematic research is nevertheless needed to study the articulatory mechanisms that enable such information coding and how it interacts with the functional need to make use of this mechanism.

The paper by Michalsky examined question intonation in German. It shows evidence of specific F0 patterns that separate questions from statements. He shows that "the phonetic realization generally provides possible cues for interrogativity in German regardless of the speaking style." The finding of the study therefore provides further evidence that functional contrasts like that of question versus statement, or even alternative question versus continuation, are clearly marked by prosodic means. This, to me, suggests the fruitfulness of

function-oriented approaches to speech prosody.

Finally, the study by Howell made a direct contrast between function-oriented approaches to intonation and formal-phonology-based approaches as represented by the AM theory. His findings show that it is more straightforward to describe American English intonation in terms of the acoustic realization of semantic categories of focus than in terms of phonological units such as pitch accents and phrase tones [Pierrehumbert 1980]. He shows clear prosodic distinctions between early, late, broad and double focus, whereas neither theory of focus projection or uniquely syntagmatic models of prominence is able to predict the observed phonetic distinctions. His finding can find further support in our own studies of American English focus intonation [Liu et al. 2013, Liu et al. 2015].

Overall, I hope this session will encourage researchers of tone and intonation to go beyond what is directly obvious in the acoustic manifestation by trying to reveal how communicative meanings are prosodically encoded based on articulatory mechanisms. The session may also inspire more direct comparisons between function-oriented and form-oriented approaches, treating them as competing theories rather than complementing approaches.

Discussant Session 2

D2.1: Phonetics of first language acquisition

Mary E. Beckman

Friday, August 14, 2015, 11:15-11:30 (followed by papers and general discussion 11:30-12:45),

Caron

Chair: Anja Lowit

In the first two years of life, most children develop the phonetic scaffolding that is needed to acquire a first language. They learn to perceptually parse the sound patterns of the words and longer utterances that are being said in their hearing, and they learn to respond to phatic utterances that are said to them, practicing a perception-production feedback loop until their vocalizations have enough semblance to the sound patterns of the ambient language that they can begin to communicate with their caretakers using speech. Over the subsequent 10 to 15 years, they fine-tune these phonetic capacities until their speech is reliably intelligible to conversational partners outside of their earliest social circles, and their perception and production patterns indelibly mark them as members of the larger speech communities in which they are growing up. How does all this happen?

This is a time-honored question in the phonetic sciences, with several important themes sounded already in Jespersen [1922] and echoed fifteen years later in two papers at the 2nd ICPhS – one on “Speech development in childhood: The function of babble” [Norman, 1936] and the other on “Baby language, the infant’s approach to the forms of adult speech” [Lewis, 1936]. The theme of Norman’s paper is that children use babbling to exercise the rhythms of the ambient language and that this supports their development of motor control for sounds in words. Her description differs from Jakobson’s [1941] account of an abrupt discontinuity between babbling and first words. It accords instead with Jespersen’s account, which emphasised the role of adults’ (mis)perception of babbling in terms of the sound shapes of their own words and how this (mis)perception becomes part of the infant’s perception-production loop to promote the transition from “muscular exercises pure and simple” into the imitative exchanges that are “the foundation

for the child's later acquisition and command of language" [Jespersen, 1922: 104-105]. This theme of the continuity between babbling and word production and the interaction between children's motor development and adults' word shapes characterises one strand of subsequent theorising [see, e.g., Ferguson & Farwell, 1975; Vihman et al. 1985]. Lewis's paper echoes a second theme in Jespersen's account of language development when he describes generalisations in the sound substitution patterns observed across children and follows Jespersen in calling them "sound laws" after the Neogrammarian term for diachronic sound changes. This terminological choice continued in a different strand of subsequent theorising when Jakobson recast the early cache of generalisations as "phonological universals" that differentiate the toddler's gradual mastery of the contrasts needed in word production from the "merely phonetic" exercise of babbling [Jakobson, 1941]. Lewis's own use of the term, however, was more cautious. He is described (in a report by an Australian delegate) as having "pointed out that the number of careful observations in this field is extremely limited, not more than half a dozen" before he "specially commended to married delegates" the need for more diary studies [Taylor, 1936: 85]. The challenge of how to enlarge the body of "careful observations" is a third perennial theme.

These themes are echoed again in the presentations in this session, which were chosen to illustrate the rich diversity of approaches to the phonetics of first language acquisition that are being developed today. For example, Loevenbruck and colleagues respond to the challenge in the third theme by using a picture-prompted word-repetition task to elicit many productions of target consonants in a controlled set of vowel environments from more than 200 child speakers of French or Drehu. They analyse transcribed accuracy rates to show how biomechanically-motivated "sound laws" are modulated by feedback from the CV rhythms of the ambient language lexicon, as assessed by type frequencies in child-directed speech corpora. Nicholson and colleagues also assess the role of the ambient language lexicon in modulating the effect of "sound laws" on young children's word productions elicited in a picture-prompted word-repetition task. They show that children's vocabulary size is a better predictor than age of transcribed accuracy and also that productions that are transcribed as accurate differ acoustically between children with smaller versus larger vocabularies. McAllister Byun and colleagues also develop finer-grained measures of young children's accuracy using perceptual ratings from adult listeners obtained by crowd-sourcing. Finally, Zharkova and colleagues describe how fine-grained measures of tongue shape and position can be derived from Ultrasound images to assess how the motor control required for adult-like coordination of consonant and vowel gestures continues to develop well after the age when most children's productions are transcribed as error free.

D2.2: Forensic phonetics and speaker characteristics

Francis Nolan

Friday, August 14, 2015, 11:15-11:30 (followed by papers and general discussion 11:30-12:45),

Dochart

Chair: Ailbhe Ní Chasaide

The forensic task which phoneticians are most generally asked to perform is speaker identification. Usually the police want to know if a suspect is the speaker on an incriminating recording. Given the plasticity of the voice, and the variability of the relationship between speech and the 'machine' producing it (the speaker), phoneticians often shy away from identification and prefer to talk in terms of speaker comparison. Whatever the terminology, the holy grail of research in this area is a set of properties which are recoverable from the (often degraded) speech signal and which vary more between speakers than within the speech of one individual.

During its early forensic application, in the third quarter of the twentieth century, phonetic speaker comparison was essentially an extension of dialectology, with a focus on the auditory analysis of consonants and, more particularly vowels – given the latter's greater robustness in telephone transmission. A lack of appreciation of the potential for perceptual equivalence in acoustically distinct signals, and of the size of relevant populations, undoubtedly led to an overestimation of the reliability of the method. As acoustic phonetic analysis became commonplace, the emphasis in speaker comparison shifted in the last quarter of the century to the 'auditory-acoustic' method, combining the trained ear with measurements of parameters such as fundamental frequency and vowel formants. The two approaches provide, to an extent, complementary information. The auditory-acoustic method remains the dominant paradigm in many jurisdictions, including the UK and Germany. But in this century, a third era has arrived with the availability of powerful techniques for automatic speaker verification/identification, relying largely on spectral information resulting from the vocal tract and coded (standardly) as Mel Frequency Cepstral Coefficients (MFCCs). Under ideal conditions, and with an appropriate reference population to draw on, these methods can estimate the likelihood that the incriminating voice sample was produced by the suspect as opposed to another speaker in the population.

The papers in this Discussant Session have in common that they look beyond the usual sources of speaker specific information, whether in perceived pronunciation, the acoustic cues (such as formants) used to characterise linguistic categories, or the vocal-tract related MFCCs of automatic methods. French et al. explicitly compare both MFCCs and an alternative spectral characterisation in terms of long term formant distributions (LTFDs) with a componential auditory analysis of voice quality. The latter 'VPA' analysis is based on Laver's [1] articulatory settings. Only supralaryngeal settings are included. The MFCC and LTFD analyses are shown to be highly correlated and similar in speaker-discriminatory power; the auditory VPA analysis less correlated, and somewhat less powerful. It is suggested that the VPA analysis may be capturing partially complementary information about the vocal tract.

Chan investigates the speaker characterising potential of tonal patterns in Mandarin and in Cantonese. The tones of the former, with its less crowded tone system, in general provide better discrimination of speakers. If f0 level is normalised, contour shape retains appreciable discriminative power. Additionally, Chan takes account of the effect of tonal environment, showing that coarticulation to 'conflicting' tones on either side of the target syllable causes a significant reduction in discrimination in Cantonese, but not in Mandarin.

With the paper by Kolly et al. we are reminded that the act of speaking involves more than the words spoken. They look not at episodes of speech but at the bits in between – the pauses. It is shown that as a speaker switches between native Swiss German and L2 English and French there is a degree of consistency in the number and duration of pauses in read sentences, as well as variation between speakers. Along somewhat similar lines, Braun and Rosin show that there is considerable variation between speakers in the distribution of different types of hesitation phenomena, and that the distribution shows stability across recordings of spontaneous speech on three different days.

All four of these papers remind us of the complexity of the speech event, and the multiplicity of ways in which speaker-specific information may be imprinted on it. Speech is both cognitive and physical, and is also crucially listener-facing, and so subject to complex constraints. The Gestalt of a 'voice' is multifaceted, as is the variation within it. These papers highlight individuality in less obvious, less researched features of the voice. The major challenge will be to find ways of exploiting these features in speaker comparison, whether within the auditory-acoustic method of speaker comparison, or as an adjunct to automatic methods.

Reference

[1] Laver, J. (1980) *The Phonetic Description of Voice Quality*. Cambridge: Cambridge University Press

D2.3: Sociophonetics

Paul Foulkes

Friday, August 14, 2015, 11:15-11:30 (followed by papers and general discussion 11:30-12:45),

Lomond Auditorium

Chair: Lauren Hall-Lew

Sociophonetics integrates principles, techniques, and theoretical frameworks from phonetics with those from sociolinguistics. Early work under this label typically involved applications of standard phonetic methods – vowel formant analysis, for example – to ‘sociolinguistic’ data, such as socially-differentiated corpora of speech, or to non-standard dialects of widely-spoken languages. In that sense such work lay truly at the intersection of phonetics and sociolinguistics and served to deliver largely incremental gains to the parent fields. (Indeed, much of the work might be pastiched as ‘sociolinguists dabbling in phonetics, and phoneticians dabbling in sociolinguistics’.)

In recent years, however, the scope of sociophonetics has broadened. While retaining a focus on speaking and listening in natural(istic) settings, sociophonetics now draws on and contributes to psycholinguistics, clinical linguistics, first and second language acquisition, theoretical phonology, conversation analysis, forensic speech science, and computational linguistics. So eclectic is the range of work now conducted that the field has been described as ‘a loose confederation of industries’ [1, p. 704], and its remit has evaded consensual definition and delimitation.

However, it is possible to discern an emerging trajectory. My own view, in a nutshell, is that truly sociophonetic research offers more than the sum of its parts. Combining phonetic methods with socially-situated data enables us to test theoretical predictions based on idealised, controlled or hypothesised materials; it provides ever more refined information about the immense range of ‘fine phonetic detail’ that human beings produce, understand and represent cognitively; it reveals the intricate relationships between variation, change, representation, and social context; and it reinforces the importance of recognising speech as a collaborative human activity.

The papers selected for this session exemplify the kind of work that I think are defined by this new trajectory. On the one hand they extend phonetic methods to new data sets, and as a consequence they identify new challenges for those methodologies. On the other, they present new data that offer significant challenges to theoretical models of speech and language.

Docherty, Gonzalez and Mitchell explore different methods of vowel analysis on a corpus of Australian English. They find striking differences between analyses based on traditional F1:F2 midpoint data, and those based on dynamic measurement over a vowel’s full duration. Their results are representative of a growing number of studies to challenge the long-standing hegemony of the F1:F2 method, which underpins many widely-accepted theories of variation and change. We can extrapolate from this study a warning against the literal interpretation of acoustic data in articulatory terms.

Stuart-Smith and colleagues also apply dynamic acoustic analysis, of vowels + liquid sequences, in a study parallel to ultrasound investigations of the same dialect, Glaswegian English. Their study is designed to

address theoretical claims made in respect of phonological representation of the contrast between /l/ and /r/ in the context of a dialect undergoing extensive change in the realisation of rhotics. Results show that speakers of different ages signal the contrast with different phonetic resources, in turn suggesting that representations of these sounds is changing over time as other processes affect the paradigmatic relationship between liquids.

Tomé Lourido and Evans describe variation and change in Galicia. Their focus is on neofalantes, Spanish-dominant bilinguals who consciously switch to Galician in adulthood for ideological or identity-related reasons. While the neofalantes' production patterns change (i.e. they develop 'hybrid' representations), their perceptual categories remain stable. The study thus questions whether cognitive representations mediate between production and perception, or are specific to one domain. The study further raises important issues in modelling within-speaker variation and change over the life course, necessitating an understanding of social as well as linguistic factors.

Ogden and Hawkins investigate rhythmic properties of question-answer pairs. Through detailed qualitative and quantitative analysis of natural conversation they show that phonetic timing is negotiated between participants in a way that parallels temporal entrainment between musicians. The authors highlight more general relationships between language, talk, gesture, and music, and address neuroscientific evidence for the synchronisation of brain activity during social interaction. The potential implications of this work are profound: the results suggest the "need for a grammar which is dynamic and which is a shared resource between participants: built not so much on a speech chain model, as on a model of socially shared cognition".

Taken together the four papers illustrate the richness and diversity of both sociophonetics, and of spoken communication.

[1] Foulkes, P., Scobbie, J.M. & Watt, D.J.L. (2010) Sociophonetics. In Hardcastle, W., Laver, J. & Gibbon, F. (eds.) *Handbook of Phonetic Sciences* (2nd ed.). Oxford: Blackwell. pp. 703-754.

D2.4: Speech perception

Valerie Hazan

Friday, August 14, 2015, 11:15-11:30 (followed by papers and general discussion 11:30-12:45),

Alsh

Chair: Alice Turk

This session will examine the notion of perceptual flexibility at two levels. During speech communication, listeners need to adapt to many different styles of speech: they hear speech produced by talkers with unfamiliar accents or non-standard articulation as well as speech that is degraded by many forms of noise or reverberation. Such perceptual flexibility is key to effective communication, yet we are far from having a clear understanding of how it develops during first language acquisition, how it is affected by the listener's language background or by the ageing process. We can also think of perceptual flexibility in terms of the substantial individual differences that are typically found in both speech intelligibility and in listeners' performance on more analytic speech-based tasks such as categorical perception tests. It has been known since the early days of experimental testing of speech perception abilities that individuals vary widely in (a) their overall performance and (b) the weighting that they give to different types of acoustic or linguistic information used to identify sounds or words. This is the case even within a 'homogeneous' participant

group as determined by factors such as age range and language background. However, little attention has been given to trying to elucidate the causes of these individual differences; many decades on from these early studies, we still have little understanding of what makes a 'good listener'.

In this session, after a general introduction by Hazan, four papers will be presented that examine these different aspects of perceptual flexibility. Baese-Berk et al. examine the individual differences in speech perception that occur in different 'adverse' conditions: when listening to speakers with dysarthria or an unfamiliar accent. In addition to examining correlations across performance on different adverse conditions, they relate intelligibility scores to performance on linguistic and cognitive tasks. In her paper, Bent considers how the perceptual flexibility that enables us to efficiently deal with unfamiliar accents develops during language acquisition. Her study evaluates word intelligibility for unfamiliar accents in quiet and noise in children aged 5 to 12 years. Rather than the emergence of perceptual flexibility, Bruggeman and Janse examine how it is affected by advancing age in listeners aged 62-85 years. Their focus is on a different aspect of speech perception: they consider patterns in lexical activation that occur in older and younger adults when the speech signal is unreliable. Finally, focusing on phonetic categorisation tasks, Kingston et al. consider whether individual performance on these types of tests can be related to personality traits. This session will end with a group discussion.

D2.5: Phonetic corpora and big data

Martine Adda-Decker

Friday, August 14, 2015, 11:15-11:30 (followed by papers and general discussion 11:30-12:45),

Boisdale

Chair: Bernd Möbius

During the last years, 'big data' has emerged as a trendy, highly promising portmanteau term in economics and high-tech domains, such as information technology and speech processing. Big data are often described using a 3V scheme: volume, variety, velocity: a huge volume of data, a large variety of possibly unstructured, heterogeneous data sources, a high frequency or velocity of data generation over time. In this Glasgow ICPhS 2015 discussant session, we will question the 'big data' term with respect to phonetics and speech sciences at large. In this context, big data typically refer to huge, generally unstructured collections of speech or audio-visual data, pre-existing any phoneticians' investigation hypotheses. Can such data become beneficial to phonetic sciences?

Speech is known to be highly variable across time and space, speakers and communities, discourse situations and recording conditions. The quest for invariants or rules of systematic variation is one of the holy grails of speech scientists. Phonetic research thus makes extensively use of speech corpora. Getting easy access to large varieties of speech collections certainly represents a positive perspective. However, big data generally come unstructured, whereas phonetic research corpora tend to be very carefully designed, collected, annotated and processed by the phonetician in view of specific investigations. Speech is enriched with metadata describing the speakers' linguistic competences and socioprofessional backgrounds: variation needs to be related to hypothesized originating or facilitating factors. Unstructured data complicate the scientific usability of big data, especially in phonetics.

Recently, new technologies dealing with unstructured data became available, including data mining, text and speech analytics, machine learning... For example, the last decades witnessed tremendous progress in automatic speech processing. Very smart speech transcription systems are nowadays available in everyday

smartphones. This progress entails at least two interesting outcomes with respect to phonetics research: (i) very large transcribed speech corpora become at reach in number of languages and (ii) automatic transcription or alignment systems may provide time-stamped linguistic annotations with limited human effort.

No papers of this session can be qualified as big data papers in the above exposed 3V sense. However, the papers all deal with large speech corpora, most of them collected out of realm of phoneticians' laboratories. Corpus content was not controlled with respect to a priori linguistic criteria, rather they were collected in somewhat controlled production situations reflecting spoken language usage in these conditions (public journalistic speech, broadcast and telephone conversations...).

The first paper by Bartkova addresses a methodological question: how to deal with very short sound segments in automatically aligned speech segmentations which are increasingly used in phonetic and linguistic studies. The paper investigates the effect of changes in acoustic analysis frame rates on phonetic segmentations using large French public radio and TV broadcast news and debates. Results show that especially for fast speech a frame shift impacts corpus-based phonetic analyses.

The second paper investigates phonological processes in Tokyo Japanese using a large corpus of broadcast speech. More particularly, Kilbourn-Ceron studies the effect of prosodic information on the known high vowel devoicing phenomenon in Tokyo Japanese across word boundaries. A special focus is given to the role of pauses, which may be part of the trigger for an alternation, or may block it.

The third paper by Chodroff examines voice onset times (VOT) in American English plosives (Mixer 6 corpus) in 130 speakers living in the Philadelphia region. Talkers were found to vary considerably in their production of VOT in word-initial stop consonants, extending previous results to more realistic speech. Results suggest talker-specific characteristics of phonetic realization to generalize across stop categories.

The last paper revisits the question dealing with the effect of word frequency on production. The proposed study by Sherr-Ziarko examines word usage frequency effects on the production of homophone words in Mandarin Chinese. The author makes use of 30 hours of Mandarin broadcast news to question the validity of previous results cross-linguistically. Results tend to indicate that lemma categorization plays a more important role in the organization of the lexicon than phonemic structure in Mandarin Chinese speakers.

Big data certainly rise high expectations and offer amazing opportunities in the next future to investigate almost any of the world's spoken languages. However, their successful use in phonetic sciences is not straightforward and even questionable. To take the best out of big data we have to think about new methodologies and need to include processing instruments relying on machine learning, data mining, automatic speech transcription and metadata production (language, dialect, speaker, emotion...) into the phonetician's toolbox.

Programme at a Glance (Overall)

Time	Day 1 (Monday 10 August)	Time	Day 2 (Tuesday 11 August)	Time	Day 3 (Wednesday 12 August)	Time	Day 4 (Thursday 13 August)	Time	Day 5 (Friday 14 August)
09:00-09:30	OPENING CEREMONY (<i>Clyde Auditorium</i>)	09:00-09:45	ORAL Session 3	09:00-10:00	ORAL Session 7	09:00-09:45	ORAL Session 9	09:00-09:45	ORAL Session 13
09:30-10:30	PLENARY Lecture 1 (<i>Clyde Auditorium</i>) Patrice Speeter Beddor	09:45-11:30	COFFEE	10:00-11:30	POSTER Session 1 (<i>Halls 1 & 2</i>)	09:45-11:30	COFFEE	09:45-11:15	COFFEE
10:30-11:30	COFFEE				POSTER Session 3 (<i>Halls 1 & 2</i>)		POSTER Session 4 (<i>Halls 1 & 2</i>)	09:45-11:15	POSTER Session 6 (<i>Halls 1 & 2</i>)
11:30-12:30	PLENARY Lecture 2 (<i>Clyde Auditorium</i>) Anne Cutler	11:30-12:30	ORAL Session 4	11:30-12:30	ORAL Session 8	11:30-12:30	ORAL Session 10	11:15-12:45	DISCUSSANT Session 2
12:30-14:00	LUNCH	12:30-14:00	LUNCH	12:30-14:00	LUNCH	12:30-14:00	LUNCH	12:45-14:00	LUNCH
14:00-15:00	IPA Exec, JPA Ed CUP meeting (<i>Fyne</i>)		JPA Meeting (<i>Aish</i>)		IPA Meeting (<i>Dochart 2</i>)		PCICPhS Meeting & bids to host ICPhS XIX (<i>Aish 1&2</i>)	12:45-14:00	PCICPhS Meeting & bids to host ICPhS XIX (<i>Aish 1&2</i>)
14:00-15:00	ORAL Session 1	14:00-15:00	ORAL Session 5		Satellite meeting::	14:00-15:00	ORAL Session 11	14:00-15:00	PLENARY Lecture 3 (<i>Lomond Auditorium</i>) Frank Guenther
15:00-15:30	COFFEE	15:00-16:45		COFFEE	1. Biomechanical Tongue Models 2. Evolution of Phonetic Capabilities 3. Prosodic Alphabet 4. Phonetic Learner Corpora 5. Geminate Consonants 6. Articulography 7. Singing in Tone	15:00-16:45	POSTER Session 5 (<i>Halls 1 & 2</i>)	15:00-16:30	COFFEE
15:30-16:30	ORAL Session 2		POSTER Session 2 (<i>Halls 1 & 2</i>)				POSTER Session 7 (<i>Halls 1 & 2</i>)		
16:30-16:40	Break							16:30-17:30	PLENARY Lecture 4 (<i>Lomond Auditorium</i>) Simon King
16:40-18:10	DISCUSSANT Session 1	16:45-17:45	ORAL Session 6			16:45-17:45	ORAL Session 12		
18:10-18:15	Break			17:45-18:45	Lapham AGM (<i>Dochart 2</i>)			17:30-18:00	CLOSING CEREMONY (<i>Lomond Auditorium</i>)
18:15-20:00	WINE RECEPTION (<i>Glasgow Science Centre</i>)					17:45-18:15	Break	18:15-00:00	CONFERENCE PARTY and CELDISH (<i>Merchant Square</i>)

List of Abstracts

DAY 1: Monday, August 10, 2015

ORAL SESSION 1**1.1: Phonetics of Korean***Monday, August 10, 2015, 14:00-15:00, Boisdale 1**Chair: Sahyang Kim*

Session 1.1, Paper 1 (14:00-14:15)

ePGG, airflow and acoustic data on glottal opening in Korean plosives*Kim, Hyunsoon; Maeda, Shinji and Honda, Kiyoshi
hyunsoonkim@hotmail.com*

This paper is concerned with glottal opening in the Korean lenis (/p t k/), aspirated (/ph th kh/) and fortis (/p' t' k'/) plosives, using a new non-invasive technique called external lighting and sensing photoglottography (ePGG) as well as airflow and acoustic data. From the simultaneous recording of ePGG, airflow and acoustic data, we have investigated (a) the timing relations among glottal opening onset and peak, glottal closing onset, airflow onset and peak, and aspiration onset in relation to acoustic events such as a consonant release onset and a vowel onset; (b) how much the peak of glottal opening area, glottal closing speed and airflow peak height occur; and (c) what acoustic conditions arise in accordance with the three-way phonation contrast.

Session 1.1, Paper 2 (14:15-14:30)

Dialectal variability in place and manner of Korean affricates*Schertz, Jessamyn; Kang, Yoonjung; Kochetov, Alexei; Kong, Eun Jong and Han, Sungwoo
jessamyn.schertz@utoronto.ca*

We examine dialect and age-related variability in the place and manner of Korean lenis affricates in speakers from Seoul and two less-studied Northern dialects. Place of articulation differed across dialects: while Seoul speakers produced affricates with a more posterior constriction (as compared to /s/), Northern speakers produced a more anterior constriction, comparable to /s/. Affricate manner of articulation was highly variable in all subgroups, ranging from "true" affricates (mostly seen in younger females from Seoul) to tokens virtually indistinguishable from fricatives. Acoustic correlates expected to distinguish affricates from fricatives (based on previous work on English) were not successful in separating the categories, exposing the need for different metrics to capture the distinction.

Session 1.1, Paper 3 (14:30-14:45)

Domain-initial denasalisation in Busan Korean: A cross-generational case study*Yoo, Kayeon
ky259@cam.ac.uk*

Korean domain-initial nasals have been reported to lose their nasality in Accentual Phrase-initial or higher prosodic domain-initial positions in the prosodic hierarchy. Researchers disagree about the exact nature of the phenomenon, and whether it should be called 'nasality weakening' instead. They also debate whether there is a proportional link between the degree of denasalisation and the relative position of the prosodic domain in which the nasal is initial. If there is, Korean denasalisation could be argued to be an interesting case of domain-initial strengthening, a phenomenon found in various languages. The paper conducts preliminary acoustic and auditory analyses of the production of domain-initial nasals by four older and four younger speakers from Busan, Korea, with the focus on revealing any pattern found in the variation in the realisation of denasalisation among the speakers and its relationship with the prosodic position.

Session 1.1, Paper 4 (14:45-15:00)

Systematic variation in the articulation of the Korean liquid across prosodic positions*Lee, Yoonjeong; Goldstein, Louis and Narayanan, Shrikanth
yoonjeol@usc.edu*

This study examined the articulatory composition of the Korean liquid in the phonological contexts that condition its allophony using real-time MRI. During the liquid, tongue tip constriction, tongue body raising and tongue root fronting motions were observed. Inter-vocalic liquids (flap percept) were produced with shorter tongue tip movement duration and smaller displacement than onset or coda liquids (lateral percept). Moreover, tongue root fronting during the liquid was associated with the smaller displacement in the flap contexts (inter-vocalic) than the lateral contexts (onset and coda). Interestingly, there was no tongue body raising observed in the flap context, suggesting that the allophony between lateral (onset and coda) and flap (inter-vocalic) is not only attributable to the overall gestural reduction, but also to a categorical distinction in gestural composition. This compositional difference challenges phonetic/phonological models that view position-sensitive allophony as resulting exclusively from dynamic variation of the abstract component gestures.

1.2: Coronals*Monday, August 10, 2015, 14:00-15:00, Boisdale 2**Chair: James M. Scobbie*

Session 1.2, Paper 1 (14:00-14:15)

Contrast reduction among coronals is conditioned by the following vowel*Hussain, Qandeel; Harvey, Mark; Proctor, Michael and Demuth, Katherine
qandeel.hussain@students.mq.edu.au*

There is evidence that coronal contrasts involving retroflexes are less clearly distinguished after a high front vowel /i/ [2, 9]. However, no detailed acoustic studies have been conducted to investigate whether following front vowels affect the contrastiveness of dentals, retroflexes and palatals. We examined the acoustic characteristics of three Punjabi coronal onsets /t̪ t̪ʃ/ produced before five vowels /i e a u o/ by 12 Punjabi speakers. The results showed that only VOT and spectral variance of the release burst reliably distinguished Punjabi coronal stops in all vocalic contexts. Centre of gravity, skewness and kurtosis of release bursts did not differentiate the coronals in the /i/ context, but did distinguish them before /e a u o/. These findings shed more light on the phonetic basis of coronal contrasts in Indo-Aryan languages, and the ways that they interact with different following vowels.

Session 1.2, Paper 2 (14:15-14:30)

The articulation of contrastive and non-contrastive pre-stopped consonants in Kaytetye

Lin, Susan; Harvey, Mark; Turpin, Myfany; Ross, Alison and Demuth, Katherine

susanlin@berkeley.edu

Kaytetye is an Australian language with a unique combination of phonemic pre-stopping in its nasal series, as well as non-contrastive pre-stopping in its lateral series. In this paper, we describe two phonetic correlates of pre-stopping in Kaytetye, segmental duration and extent of tongue movement. With nasals, pre-stopped segments are longer and have greater tongue movement than their plain counterparts. Neither of these patterns holds for laterals. We interpret these differences in light of their phonemic status.

Session 1.2, Paper 3 (14:30-14:45)

A comparison of the acoustics of nonsense and real word stimuli: Coronal stops in Bengali

Maxwell, Olga; Baker, Brett; Bundgaard-Nielsen, Rikke and Fletcher, Janet

omaxwell@unimelb.edu.au

Research suggests that nonsense and real words often exhibit differences in their acoustic properties. Despite this, the use of nonsense stimuli is prevalent in acoustic analyses of a range of phenomena and in experimental studies of segmental perception. The present study examined stop duration and preceding vowel formant transitions for two Bengali coronal stops produced in real and nonsense word stimuli. Firstly, significant differences were observed based on the stimulus type. Nonsense word production showed more distinct dental-retroflex differentiation. Secondly, the results revealed that F3 was a more reliable cue to place of articulation than closure duration and voice onset time.

Session 1.2, Paper 4 (14:45-15:00)

Production planning and coronal stop deletion in spontaneous speech

Tanner, James; Sonderegger, Morgan and Wagner, Michael
james.tanner@mail.mcgill.ca

Coronal stop deletion in English word-final consonant clusters (CSD), one of the most studied variables in sociolinguistics, has been consistently shown to be affected by the preceding and following phonological context. Previous work

has treated a following pause as one type of context, on par with a following consonant or vowel. Looking at deletion rates in a corpus of spontaneous speech, we instead treat pause as a quantitative proxy for boundary strength and test the hypothesis that not only does pause by itself gradually reduce deletion rate, but also modulates the effect of a following phonological segment, as predicted if phonological processes are constrained by the locality of production planning. We show that the influence of a following segment on CSD decreases with increasing boundary strength, but not that of a preceding segment: an asymmetry that provides direct support for the production planning locality hypothesis.

1.3: Voicing Patterns

Monday, August 10, 2015, 14:00-15:00, Carron

Chair: Helen Hanson

Session 1.3, Paper 1 (14:00-14:15)

Patterns of voicing in American English voiced obstruents in connected speech

Davidson, Lisa

lisa.davidson@nyu.edu

Previous research shows that the implementation of obstruent voicing in American English is strongly influenced by adjacent sounds and prosodic factors, but studies mainly focus on words in isolation and carrier phrases. This study examines the voicing of stops and fricatives in phrase-medial position in the connected speech of 37 speakers. Results indicate that stops devoice most often word-initially or next to other obstruents (regardless of voicing). Fricatives devoice word-finally, but are less affected by the adjacent sound. An analysis of where voicing is realized in the constriction interval shows that bleed from a preceding sonorant is common, but voicing beginning partway through the constriction interval is almost non-existent. Aerodynamic and articulatory implications of the results are discussed

Session 1.3, Paper 2 (14:15-14:30)

Stop voicing and F0 perturbations: Evidence from French and Italian

Kirby, James and Ladd, D. Robert

j.kirby@ed.ac.uk

We report new experimental evidence on consonant-induced F0 perturbations in two languages with prevoiced stops, French and Italian. A positive correlation between duration of voicing lead and F0 at the onset of post-release voicing is observed, consistent with the predictions of an automatic or biomechanical account of the source of this effect. While the findings do not strictly rule out a role for onset F0 as a controlled enhancement, they support the proposal that, if anything, the enhancement is of [-voice] or [stiff] rather than [+voice].

Session 1.3, Paper 3 (14:30-14:45)

Voicing contrast in Turkish: Simultaneous measurements of acoustics, EPG and intraoral pressure

Unal Logacev, Ozlem and Fuchs, Susanne

ozlemonal@anadolu.edu.tr

The aim of this study was to investigate the Turkish voicing contrast with simultaneous measurements of acoustics, EPG and intraoral pressure. We further aimed to understand the mechanisms behind the maintenance or disappearance of voicing in Turkish. According to our results, intraoral pressure rises more slowly for voiced sounds than for their voiceless counterparts. Voiced fricatives have shorter duration, more palatal contact, and lower intraoral pressure velocity maximum compared to voiceless cognates. Furthermore, we found a positive correlation between intraoral pressure and the number of (relative) anterior palatal contacts.

Session 1.3, Paper 4 (14:45-15:00)

Voicing variations in French obstruents: Distribution and acoustic quantification

*Ivent, Fanny; Adda-Decker, Martine and Fougeron, Cécile
fanny.ivent@univ-paris3.fr*

This study investigates phonetic variation of voicing correlates in French obstruents. A controlled set of words was extracted from a large broadcast news corpus providing 378 word-initial singleton obstruents /t, d, k, s/. An expert investigation, by eye and ear, of the productions revealed that phonologically voiced obstruents are phonetically voiced most of the time (96%), while a large number of phonologically voiceless obstruents are produced with a partial or complete phonetically voiced constriction, more frequently so for stops (74% /t/, 61% /k/) than for fricatives (30% /s/). In order to acoustically quantify our observations and establish reliable metrics for future larger-scale studies, 13 acoustic metrics were applied and tested. Out of these, three metrics were found to be particularly effective in accurately classifying our obstruents into the manually defined categories: an energy difference measure relative to the following vowel, an unvoiced/voiced frame ratio, and consonant duration.

1.4: Lexical F0 and Focus

Monday, August 10, 2015, 14:00-15:00, Gala

Chair: Brechtje Post

Session 1.4, Paper 1 (14:00-14:15)

Examining lexical tonal contrast in Norwegian using intonation modelling

*Kelly, Niamh and Schweitzer, Katrin
niamh.kelly632@gmail.com*

The Trøndersk dialect of East Norwegian is rather unusual typologically in that it exhibits a tonal contrast (unmarked vs. circumflex) on monosyllabic words [7, 1, 20]. The goal of the current study was to examine this contrast and how it is impacted by sentential focus. Ten speakers of the Trøndersk dialect were recorded reading target monosyllabic words with these accents embedded in sentences with broad and narrow focus. In broad focus, words with the unmarked accent have an L tone and words with the circumflex accent have an HL contour with a higher F0 maximum and vowel onset than the unmarked contour. In narrow focus, both ac-

cents have a wider pitch range and later low tone alignment. Phonologically long vowels were lengthened under narrow focus. This study adds to the literature on the realization of focus in pitch accent languages, and the interaction between prosodically marked focus and lexical accents.

Session 1.4, Paper 2 (14:15-14:30)

The acquisition of prosodic focus-marking in Central Swedish: Sorting out lexical and post-lexical tones

*Romoren, Anna Sara H. and Chen, Aoju
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In many languages prosody is used for marking focus, but the way this is done varies from one language to the next. Previous work on the acquisition of prosodic focus marking has been centred on English, German and Dutch; thus little is known about how prosodic focus is acquired outside West-Germanic varieties. We present a study of prosodic focus marking in Central Swedish, showing how the focus-marking high tone is used in an adult-like way from the age of seven, but that children between four and five are still developing toward adult proficiency.

Session 1.4, Paper 3 (14:30-14:45)

Target-like distribution of Norwegian lexical pitch accents in spontaneous speech produced by L2 speakers

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In this paper, we present a study of tonal patterns of Accental Phrases (APs) in spontaneous speech produced by ten Second Language (L2) speakers of Norwegian. The speakers are multilingual, and their dominant language is either Lingala or Swahili. Analyses of 1000 APs (100 per speaker) show that all the speakers produce the expected lexical pitch accent in a significant majority of the cases. Our initial hypothesis that the Lingala speakers, by virtue of speaking a language with lexical tones, have an advantage over the Swahili speakers in the acquisition of the Norwegian lexical pitch accents is not supported by the data.

Session 1.4, Paper 4 (14:45-15:00)

Voicing in Polish: Interactions with lexical stress and focus

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We examine the dynamics of VOT in Polish stops under lexical stress and focus. We elicit real Polish words containing voiced and voiceless stop+/a/ syllables in primary, secondary and unstressed, as well as focus positions. We also correlate VOT with speech rate estimated on the basis of equisyllabic word length. Our results show that the relationships between prosody and VOT are consistent with the status of Polish as a true voicing language.

1.5: Speech Perception I

Monday, August 10, 2015, 14:00-15:00, Dochart

Chair: Robin Lickley

Session 1.5, Paper 1 (14:00-14:15)

Cumulative effects of phonetic context on speech perception

Zhang, Caicai; Peng, Gang; Wang, Xiao and Wang, William Shi-Yuan
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Different speakers produce speech sounds differently. The phonetic context is known to facilitate the recovering of phonological categories from productions with talker variation. However, whether the context effect originates from central auditory processing or speech-related processing remains debated. It is worth noting that the context effect may be a combined effect, contributed by both auditory and speech-related processing. To investigate this question, we compared the effect of four types of contexts with incrementally more cues (nonspeech, reversed speech, meaningless speech and meaningful speech) on perception of Cantonese level tones. Results indicate that the context effect is a product of multiple levels of processing, with the primary contribution from phonological cues (meaningless speech context). The contribution of auditory cues is negligible, and that of phonetic cues and semantic+syntactic cues is both moderate. Phonological cues likely enable listeners to calibrate the acoustic-to-phonological mapping of speech sounds for each talker, facilitating the categorization.

Session 1.5, Paper 2 (14:15-14:30)

Generalization of dimension-based statistical learning

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Recent research demonstrates that the diagnosticity of an acoustic dimension for speech categorization is relative to its relationship to the evolving distribution of dimensional regularity across time and not simply to its fixed value along the dimension. Two studies examine the nature of this learning in online word recognition, testing generalization of learning across lexical contexts, and testing the extent to which variability in the training inventory affects learning. The results indicate that learning generalizes poorly across lexical contexts, but generalization may be boosted when listeners experience the dimensional regularity across multiple lexical items.

Session 1.5, Paper 3 (14:30-14:45)

The effect of target-background synchronicity on speech-in-speech recognition

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The aim of the present study was to investigate whether speech-in-speech recognition is affected by variation in the target-background timing relationship. Specifically, we examined whether within trial synchronous or asynchronous onset and offset of the target and background speech influenced speech-in-speech recognition. Native English listeners were presented with English target sentences in the presence of English or Dutch background speech. Importantly, only the short-term temporal context –in terms of onset and offset synchrony or asynchrony of the target and background speech– varied across conditions. Participants' task was to repeat back the English target sentences. The results showed an effect of synchronicity for English-in-English but not for English-in-Dutch recognition, indicat-

ing that familiarity with the English background lead in the asynchronous English-in-English condition might have attracted attention towards the English background. Overall, this study demonstrated that speech-in-speech recognition is sensitive to the target-background timing relationship, revealing an important role for variation in the local context of the target-background relationship as it extends beyond the limits of the time-frame of the to-be-recognized target sentence.

Session 1.5, Paper 4 (14:45-15:00)

Release bursts vs. formant transitions in Polish stop place perception

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A perception study with acoustically manipulated tokens sought to establish the relative weight of noise vs. formant transition cues in the perception of stop place of articulation by Polish listeners, and to replicate previous findings from a crowdsourced experiment. Results suggest that noise cues are primary for Poles in stop place identification. It is argued that this finding is compatible with other aspects of Polish phonology, including the obligatory release of coda stops, and the relatively pure quality of vowels in the language.

1.6: Sociophonetics I

Monday, August 10, 2015, 14:00-15:00, Alsh

Chair: Felicity Cox

Session 1.6, Paper 1 (14:00-14:15)

Sociophonetics of the velarized lateral in the Viennese dialect

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The alveolar lateral of the Viennese dialect undergoes several allophonic processes; among these, vocalization and velarization are the most prominent ones. In the current contribution, we will concentrate on the sociolinguistic aspects which disturb the complementary distribution of the alveolar and the velarized lateral and give rise to a possible reversal of the velarization process which started around 1900 due to contact with Czech immigrants. We investigate the realization of the alveolar and the velarized lateral in a corpus of spontaneous speech of 11 Viennese dialect speakers. F2 of the lateral is measured to describe the effect of the parameters phoneme context, syllable stress, word position and gender on the lateral realization. Results show that the velarized lateral is mainly produced between back vowels and in wordfinal position. Male speakers produce the velarized lateral also in stressed position, while female speakers, if at all, produce it in the unstressed word-final position.

Session 1.6, Paper 2 (14:15-14:30)

Gender-specific differences in sibilant contrast realizations in English and German

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This study examines possible differences between the

acoustic realization of the intersibilant contrast /s/~/ʃ/ in German and American English. A range of acoustic parameters (COG, standard deviation, skewness, kurtosis and Discrete Cosine Transformation coefficients) are calculated to characterize the spectra of the two sibilants. Significant differences are found between the male and female intersibilant contrast, indicating that females produce a stronger acoustic contrast between /s/ and /ʃ/ in both languages. While in the German data set a tendency for gender-specific differences in accent realizations was found, the effect did not reach significance.

Session 1.6, Paper 3 (14:30-14:45)

Acoustic analyses of differences in [ç] and [ʃ] productions in Hood German

*Jannedy, Stefanie; Weirich, Melanie and Helmeke, Louisa
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[2] postulates that the multi-ethnolect Hood German (as spoken in Berlin, Ger) differentiates three realizations of /ç/: [ç], [ç] and [ʃ]. Earlier acoustic analyses of 1192 tokens of /ç/ from the ZAS-spontaneous speech database (collected from 9 adolescent speakers of the Hood German multiethnolect) [9] showed no reliable differences in curtosis, skewness, cog or peak between items impressionistically categorized into these three groups. For a more controlled study, we have now collected 3 minimal pairs contrasting /ç/ with /ʃ/, read 1) embedded in carrier sentences and 2) as word lists. 32 adolescents from a middle school in Kreuzberg (Berlin) participated in this study. Many of them had multi-ethnic backgrounds and spoke languages other than German at home, but several students also were monolingual mono-ethnic Germans. Results indicate that there is a strong tendency for /ç/ and /ʃ/ to merge in the speech of young Kreuzberg adolescents and that the language background (monolingual versus multilingual), has an influence on the realization of /ç/ as [ç], [ç] or [ʃ]. However, also monolingual mono-ethnic Germans show a strong tendency for merging and dismissing this contrast. Moreover, our data suggests that locally identifying as somebody from Kreuzberg in contrast to just Berlin is a predictor for palatalization.

Session 1.6, Paper 4 (14:45-15:00)

Intonational variation in Liverpool English

*Nance, Claire; Kirkham, Sam and Groarke, Eve
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This paper investigates intonational variation in Liverpool English, a dialect of British English that is recognised as having a number of distinctive phonetic characteristics [15, 16]. One previously reported aspect of Liverpool intonation is the presence of rising contours in declaratives as part of the traditional dialect [7]. Here we present a phonological Autosegmental Metrical analysis [9] and a phonetic analysis of intonation in different sentence types from 9 speakers. Results suggest that traditional Liverpool rising nuclear contours are common among 20–22 year olds from Liverpool. Through analysis of these data, we aim to contribute to descriptions of intonational variation in the UK, and wider studies of intonational variation and typology.

1.7: Topics in Speech Production

Monday, August 10, 2015, 14:00-15:00, Forth

Chair: Pilar Prieto Vives

Session 1.7, Paper 1 (14:00-14:15)

Coordination of eyebrow movement with speech acoustics and head movement

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Studies on the relationship between eyebrow movement and other aspects of speech production have focused on large, discrete movements of the eyebrows. Using integrated optical and electromagnetic point tracking, we measured eyebrow movements relative to the skull with a high level of precision. These data in combination with a correlational analysis method that accommodates varying phasing between the signals enabled the investigation of the relationship between continuous eyebrow movements, speech acoustics, and head movements. Our results show that there was a correlation between eyebrow movements and speech acoustics, though there was notable variation within and across participants. The relationship between eyebrow and head movements was much closer, with a strong correlation between eyebrow movement and subsequent head movement, which held across participants. We discuss the implications for theories of gestural control in speech production.

Session 1.7, Paper 2 (14:15-14:30)

Acoustic evidence of articulatory adjustments to sustain voicing during voiced stops

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The present study seeks to provide acoustic evidence of articulatory adjustments to initiate and sustain voicing during stops. First, using aerodynamic and acoustic data, it examines variations in the amplitude of voicing in phrase-initial voiced stops in Spanish and English and relates these variations to articulatory adjustments to preserve a low oral pressure and voicing. Second, a correlation is sought between oral pressure and voicing amplitude during stop closure. The correlation is significant for all Spanish (4) and English (2) speakers; as oral pressure rises, voicing amplitude decreases. The study concludes that articulatory adjustments to keep a low intraoral pressure for voicing may be inferred from the time course of voicing amplitude during the stop closure. Significant differences between prevoiced stops in the two languages are found, with overall higher values for oral pressure and lower values for voicing amplitude in English than in Spanish.

Session 1.7, Paper 3 (14:30-14:45)

Coordination of lexical and paralinguistic F0 in L2 production

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The present study examines the coordination of lexical and

paralinguistic F0 in second language (henceforth L2) production. We tested how L2 learners manage to handle F0 when F0 in their first language (henceforth L1) carries a paralinguistic function, but a lexical one in their L2 and vice versa. Participants (fifteen L1 Japanese speakers and fifteen L1 German speakers, proficient also in their respective L2s) were asked to repeat the same words after an alleged communication failure. Our results demonstrate negative transfers from the learners' L1 to their L2 in both Japanese and German. The findings are particularly telling, since the words analyzed are very frequent ones, and of which learners should have sufficient L2 input, suggesting that a rich amount of input is not sufficient to the formation of an appropriate F0 in the L2.

Session 1.7, Paper 4 (14:45-15:00)

Morphological effects on pronunciation

*Mousikou, Petroula; Strycharczuk, Patrycja; Turk, Alice; Rastle, Kathleen and Scobbie, James M.
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Converging, albeit inconsistent, empirical evidence suggests that the morphological structure of a word influences its pronunciation. We investigated this issue using Ultrasound Tongue Imaging in the context of an experimental cognitive psychology paradigm. Scottish speakers were trained on apparently homophonous monomorphemic and bimorphemic novel words (e.g. zord, zorred), and tested on speech production tasks. Monomorphemic items were realised acoustically with shorter durations than bimorphemic items; however, this difference was not statistically significant. Progressive coarticulatory effects were also observed in the monomorphemic condition for some speakers. A dynamic analysis of the articulatory data revealed that the observed differences in the pronunciations of the two types of items could be due to factors other than morphological structure. Our results, albeit inconclusive, make a significant contribution to the literature in this research domain insofar as the presence or absence of morphological effects on pronunciation has important implications for extant theories of speech production.

socially-stratified, audio-ultrasound corpus of Scottish English containing recordings from two sociolects; one with postvocalic /r/ weakening and the other with strengthening. We quantify auditory strength of rhoticity and the timing of the anterior lingual gesture relative to the offset of voicing in CVr words: bar, bore, fur, or onset of a following consonant in CVrC words: farm, herb, burp, in order to show that there is a statistically significant correlation between weak rhoticity and a late articulatory gesture. Our ultrasound data also show that during the process of final consonant vocalization/deletion, underlying articulatory gestures may persist.

Session 2.1, Paper 2 (15:45-16:00)

Intergestural organisation and CV-overlap in palatalised liquids in Russian

*Stoll, Taja; Harrington, Jonathan and Hoole, Philip
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The current study investigates secondary palatalisation and its influence on vowels in liquids /lj/ and /rj/ in Russian, using Electromagnetic Articulography. First, temporal organisation between primary and secondary gestures in different word-positions and at different speech rates is analysed. Second, the overlap between secondary gesture and vowel /a/ in word-initial and -final positions is examined. Six native Russian speakers articulated real words embedded in a carrier sentence at a slow and a fast speech. The results show that there is a greater variation in intergestural timing in /rj/ than in /lj/ subject to domain position and speech tempo. It is especially in word-initial position at slow speech rate where the lag between two gestures in /rj/ is the biggest. As a consequence, there is more overlap between secondary gesture and the vowel in word-initial position for /rj/ in comparison to /lj/.

Session 2.1, Paper 3 (16:00-16:15)

Gestural coordination of Brazilian Portuguese nasal vowels in CV syllables: A real-time MRI study

*Meireles, Alexsandro; Goldstein, Louis; Blaylock, Reed and Narayanan, Shrikanth
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The coordination of velum and lingual gestures for Brazilian Portuguese nasal vowels in CV syllables is studied with real-time magnetic resonance imaging (rt-MRI). Four syllable structures were compared: stop-oral vowel, stop-nasal vowel, nasal-oral vowel, nasal-nasal vowel. Results show near-synchrony timing (in-phase) for the consonant onset and nasal vowel's lingual onset, and for the consonant release and velum onset in the stop-nasal vowel syllable structure. The other syllabic structures present near-synchrony timing (in-phase) for all their gesture's onsets.

Session 2.1, Paper 4 (16:15-16:30)

Effects of phonological competition on speech planning and execution

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Competition between phonologically similar sequences in an utterance is one of the major causes for speech production errors. Additionally, phonological competition has been

ORAL SESSION 2

2.1: Gestural Coordination

Monday, August 10, 2015, 15:30-16:30, Alsh

Chair: Sam Tilsen

Session 2.1, Paper 1 (15:30-15:45)

The role of anterior lingual gesture delay in coda /r/ lenition: An ultrasound tongue imaging study

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We investigate the contribution that lingual gesture delay makes to lenition of postvocalic /r/. This study uses a

found to increase planning time and slow down speech rate in CVC word pairs. The aims of this study are to investigate the timecourse of phonological competition by employing different tasks and by a detailed gestural analysis. Effects of competition in the onset ("top cop" and "pay Kay") are compared to competition in the coda (e.g. "top tock") and both were compared to sequences of identical words (e.g. "top top"). Results from three studies are reported: acoustic latencies from a delayed naming task and a simple naming task (18 speakers), and articulatory latencies from a delayed naming task using EMA (6 speakers). Reaction time was affected by competition but not by locus. Mismatch in the coda lengthened the execution time most prominently in the final rime.

2.2: Production of Liquids

Monday, August 10, 2015, 15:30-16:30, Boisdale 1

Chair: Susanne Fuchs

Session 2.2, Paper 1 (15:30-15:45)

An EMA examination of liquids in Czech

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This paper examines the liquid segments in Czech (/r/ and /l/) using articulography. The mid-sagittal and parasagittal contours of the liquids were compared. 5 speakers of Czech produced nonsense words in three environments: word-initial, intervocalic, and word-final position. The results indicated that /l/ is articulated further forward in the mouth and has a larger pre-constriction vocal tract volume. The lateral constriction is created on the left side by activation of the styloglossus, forming a constriction approximately 2 cm in width and results in a side-cavity in the anterior portion of the mouth. The side cavity is responsible for the anti-formants characteristic of /l/ sounds. /r/ is articulated higher in the mouth to create a strong lateral lock, permitting tongue tip trilling. /r/ is also not articulated with a retracted tongue dorsum, resulting in a higher F3 than in English.

Session 2.2, Paper 2 (15:45-16:00)

An EPG+UTI study of Italian /r/

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This paper describes a system for the acquisition, real-time synchronization and analysis of acoustic, electropalatographic (EPG) and ultrasonographic (UTI) data. Simultaneous data on linguo-palatal contact and tongue sagittal profiles are captured for rhotic consonants produced by a native speaker of Italian. Three anterior variants of /r/ ([r], [ɹ] and [ɻ]) are shown to be realized with an apical tongue gesture, but different vowel-related coarticulation patterns. The paper discusses the implication of the proposed analysis for a coherent investigation of lingual and linguo-palatal dynamics.

Session 2.2, Paper 3 (16:00-16:15)

Determining categoricity in English /l/-darkening: A principal component analysis of ultrasound spline data

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Although syllable-based accounts of /l/-darkening in English state that light [l] occurs in onsets (e.g. 'leap') and a dark [ɫ] in codas (e.g. 'peel'), analyses of the process from several phonetic studies have led to some arguing against an allophonic distinction altogether, stating that the difference between light and dark variants is merely two extremes of one continuum. The current paper attempts to address this debate using ultrasound tongue imaging, in particular, a Principal Component Analysis (PCA) of tongue spline data. Although PCA of spline contours may be seen as a relatively rough method when compared with analysis of raw pixel images, it is argued that the simplicity of attaching one individual figure to a contour is a highly efficient and convenient method for observing general patterns in the data.

Session 2.2, Paper 4 (16:15-16:30)

An ultrasound examination of taps in Japanese

Yamane, Noriko; Howson, Phil and Wei, Po-Chun

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This paper used ultrasound technology to examine the plain and palatalized taps in Japanese. Six participants of Japanese produced nonsense words containing /r/ and /rj/. The mid-sagittal contours were compared in three intervocalic contexts: a_a, o_o, u_u. The results showed that /r/ had a great deal of variability around the tongue dorsum. This suggests that /r/ lacks a dorsal gesture; unlike the other members of the rhotic class, it is solely a tongue tip gesture. /rj/ was articulated with a raised tongue body and fronted tongue dorsum. The palatalization gesture was resistant to coarticulatory effects, suggesting that it is important for contrast maintenance. The results also suggest that an inconsistency between palatalization and rhotics cannot be related to the constraints on the dorsal gesture because the dorsal gesture seems to be inert for the taps. Rather palatalization is likely to interfere with the apical gesture associated with rhotics.

2.3: Influences on L2 Learning

Monday, August 10, 2015, 15:30-16:30, Gala

Chair: Valerie Hazan

Session 2.3, Paper 1 (15:30-15:45)

Third language pronunciation performance and metaphonological awareness: A correlational study

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The paper aims at exploring the relationship between perceived pronunciation performance and metalinguistic awareness in the acquisition of third language phonology. The study involved 27 participants with Polish as L1, English as L2 and French as L3. In the first part of the study, third language pronunciation performance was assessed by means of online ratings involving 3 components: foreign accentedness, comprehensibility and pronunciation accuracy

judgements. In the second part, metaphonological awareness was investigated through the application of stimulated recall verbal protocols. A composite measure was calculated based on self-repair of L3 pronunciation, performed phonetic analysis, manifested self-awareness of pronunciation problems and metacognitive comments on cross-linguistic interactions. The findings point to patterns of correlations between the participants' measures of metaphonological awareness and their pronunciation ratings. Generally, the participants with higher levels of awareness were perceived as less foreign accented, more intelligible and accurate in terms of their L3 pronunciation performance.

Session 2.3, Paper 2 (15:45-16:00)

What factors predict age effects in L2 perception: A comparison of social, cognitive, and experiential factors

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Previous research has demonstrated that age of acquisition (AOA) plays an important role in L2 phonological acquisition. However, it is not clear why such AOA effects occur. Researchers have hypothesized that these effects may be explained by social (such as identification with L1/L2 culture), cognitive (ability to imitate, working and phonological memory capacity), and experiential (length of residence and amount of L2 use) factors. However, little research has compared all three types of factors in the same study; nor has it determined whether these factors affect early and late learners differently. The current study seeks to fill this gap by asking seventy-six Spanish learners of English with different AOAs (0-69) to participate. Their accuracy on an L2 perception task was compared to their scores on the cognitive tasks, social factors and experiential factors noted above. Results demonstrate different factors were important for different AOAs and that all three types of factors played important roles.

Session 2.3, Paper 3 (16:00-16:15)

Learning pronunciation variants in a second language: Orthographic effects

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The present study investigated the effect of orthography on the learning and subsequent processing of pronunciation variants in a second language. Dutch learners of French learned reduced pronunciation variants that result from schwa-zero alternation in French (e.g., reduced /ʃnij/ from chenille 'caterpillar'). Half of the participants additionally learnt the words' spellings, which correspond more closely to the full variants with schwa. On the following day, participants performed an auditory lexical decision task, in which they heard half of the words in their reduced variants, and the other half in their full variants. Participants who had exclusively learnt the auditory forms performed significantly worse on full variants than participants who had also learnt the spellings. This shows that learners integrate phonological and orthographic information to process pronunciation variants. There was no difference between both groups in their performances on reduced variants, suggesting that the exposure to spelling does not impede learners' processing of these variants.

Session 2.3, Paper 4 (16:15-16:30)

On improving the pronunciation of French /r/ in Chinese learners by using real-time ultrasound visualization

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Chinese natives are known to perform poorly in /r/ pronunciations when learning French. They tend to produce their native /x/ sound. In this study, we compare two learning methods of French /r/: the traditional method using colloquial explanations of the pronunciation and a newly developed method using ultrasound images to demonstrate tongue movements in real-time. Two distinct groups including 10 Chinese learners participated in the experiments. A preliminary perceptual experiment confirmed their weak discrimination capacity between French /r/ and Mandarin /x/. Acoustic HNR and COG measures on pre-and post-training productions allowed us to quantify their progress in productions. The proposed ultrasound technique is shown to be efficient for foreign language pronunciation learning. By using real-time ultrasound visual feedback, Chinese learners have speeded up their ability to depart from Mandarin /x/ towards French /r/ articulation and to produce a better French /r/ at the end of the training.

2.4: Tone and Tonal Contrasts

Monday, August 10, 2015, 15:30-16:30, Carron

Chair: Jacqueline Vaissière

Session 2.4, Paper 1 (15:30-15:45)

Prosodic structure and intonation in Koasati

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This paper provides a description of prosodic structure and intonational properties of Koasati, an endangered Muskogean language spoken by approximately 300 people in Louisiana and Texas. Words in Koasati group into Accental Phrases (AP), which are characterized by an initial and final high tone. Accental Phrases in turn combine to form Intonational Phrases (IP), which are defined by a final boundary tone: L% (or for certain speakers LH%) in statements, H% in questions, and HL% in commands. In addition to intonational tones, Koasati also has tonal accents of three types. First, there is lexical tone associated with certain nouns and certain verbal affixes. Second, tone is used morphologically to convey aspectual distinctions in verbs. Finally, predictable accents may dock on the penultimate syllable of the stem and on heavy syllables (those containing a long vowel or a coda sonorant).

Session 2.4, Paper 2 (15:45-16:00)

Lexical and post-lexical tone in Choguita Rarámuri

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This study proposes a model of the intonation of Choguita

Rarámuri (Tarahumara), a Uto-Aztecan language spoken in Chihuahua, Mexico. Tonal patterns of utterances were examined by varying the length of a word and a phrase, the location of lexical stress-tone, and sentence types. The only attested prosodic unit above the prosodic word is the Intonational Phrase (IP), which is usually marked by a high boundary tone. Additionally, there are optional tonal targets before lexical tones, which we term "lead tones". These do not seem to be demarcative tones, as they are variable in their location. Interestingly, the lead tones are either high or low, depending on the following lexical tone. Thus, we suggest that lead tones occur optionally for rhythmic purposes and/or to enhance the targets of lexical tones.

Session 2.4, Paper 3 (16:00-16:15)

Modeling Iu Mien tone with eigenpitch representations

*Shosted, Ryan; Barlaz, Marissa and Wu, Di
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To achieve adequate description of an understudied tone language, we argue for unsupervised computational modeling of lexical tone, even at the earliest stages of documentation. We apply a technique using eigenvalues and discriminant analysis to differentiate lexical tones on monosyllabic items in Iu Mien. The resulting 'eigenpitch' representations can be used to evaluate the differences and similarities between tones, to sharpen the impressions of field linguists, and to contribute to a richer understanding of phonemic tonal contrasts.

Session 2.4, Paper 4 (16:15-16:30)

Perception of Pseudoswedish tonal contrasts by native speakers of American English: Implications for models of intonation perception

*Barnes, Jonathan; Brugos, Alejna; Veilleux, Nanette and Shattuck-Hufnagel, Stefanie
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Results from an experiment on perception of lexical pitch accents in Gothenburg Swedish (11) showed that both higher initial F0 plateaux and later falls biased native listeners toward the Accent 2 category, while lower plateaux and earlier falls biased toward Accent 1. Segerup and Nolan interpret this as evidence for a perceptual mechanism integrating scaling and timing information, which they model using a measure of Area under the F0 Curve. It is not clear, however, that this result generalizes beyond native listeners. An analogous experiment on American English listeners demonstrates the same perceptual biases, suggesting that the mechanism responsible is indeed a more general phenomenon, and that it involves the integration of pitch information over time during some region of interest. An alternative to the AUC model, based on the Tonal Center-of-Gravity, could also account for these results, though current data do not distinguish between the two models.

2.5: Language Change

Monday, August 10, 2015, 15:30-16:30, Boisdale 2

Chair: Daniel Lawrence

Session 2.5, Paper 1 (15:30-15:45)

Glottalization and Taiwan Min checked tone sound change

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This study investigates the glottalization of Taiwan Min checked tones with CV[p, t, k, ?] syllable structures. The results of Electroglossography (EGG) and acoustic measures showed that above 80% of [?] and below 15% of [p, t, k] were deleted. Codas were most often realized as energy damping during the vowel final portion. Full stop closures were observed significantly more often among Tone 3 and sandhi tones. Codas are rarely realized with an aperiodic voicing. In the non-final position of the tone sandhi group, the occurrence of contact phases during the coda were less than 30%. Moreover, checked Tone 3 was produced with the shortest glottal contact quotient. However, in the final position of the tone sandhi group, the mid-frequency spectral tilt, H1*-A3*, and the glottal contact quotient were indistinguishable between the two checked tones, suggesting a sound change in voice quality.

Session 2.5, Paper 2 (15:45-16:00)

Does vowel intrinsic f0 affect lexical tone?

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Diachronic change has often been linked with synchronic instability and the realignment of phonological categories according to fine phonetic detail. For example, the development of tones in some languages is widely believed to have been the result of coarticulatory influences of onset obstruent voicing contrasts on the fundamental frequency (f0) of the following vowel. This is just one example of a phenomenon known as intrinsic f0. Our goal was to investigate whether lexical tone can be influenced by vowel intrinsic f0 effects. In a study of Hong Kong Cantonese, we found that f0 is significantly affected by both lexical tone and vowel openness. Vowel intrinsic f0 effects caused substantial overlap between the tones. We thus find evidence of synchronic instability leading to overlap between distinct phonological categories. These findings may contribute greatly to our understanding of the phonetic precursors to sound change.

Session 2.5, Paper 3 (16:00-16:15)

Raising of /a/ in Copenhagen Danish – Perceptual consequences across two generations

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This study concerns differences in the perception of phonemes that have undergone near merger within the past few generations in the Copenhagen speech community. It is hypothesized that this process can lead to a difference in phoneme boundaries across generations. We studied the effect of speaker and listener age on the placement of the phoneme boundary between /ɛ/ and /a/ in Copenhagen Danish using a forced choice word identification task. The results show that younger listeners accept a greater range of vowels as tokens of /a/ in accordance with the changes in production of this phoneme.

Session 2.5, Paper 4 (16:15-16:30)

An experimental investigation of tonogenesis in Punjabi
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In this study, we provide a detailed phonetic description of the F0 patterns of Punjabi, an Indo-European language that is believed to be undergoing tonogenesis. The purported emergent tone in Punjabi is associated with only one class of consonants – those which are thought to be historically voiced aspirated, but now may have lost both aspiration and voicing, instead being differentiated from other consonants by F0. Using data from 6 native Punjabi speakers (3F, 3M) and careful phonetic analysis, we confirm that these consonants are now realised as unaspirated, and, word-initially, also as voiceless. We also find that these consonants induce a falling F0 in the following vowel, but only in word-initial position. Noting that Punjabi nouns are usually stressed word-initially, this pattern of restricted F0 modulation closely resembles languages with emerging tone or “pitch accent”.

2.6: Phonetics-Phonology Interface I

Monday, August 10, 2015, 15:30-16:30, Forth

Chair: Maria-Josep Solé

Session 2.6, Paper 1 (15:30-15:45)

Relation between syllable count judgments and durations of English liquid rimes
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Judgments of the number of syllables in a given word are usually consistent, but there is a class of English words with liquid codas and tense vowel/diphthong nuclei for which speakers have variable syllable count intuitions (e.g. fire, feel). This variation has previously been hypothesized to be associated with differences in subsyllabic structural organization, which predicts that speaker judgments of syllable count should correlate with produced rime durations. To test this hypothesis, 34 native speakers of English participated in sequential and parallel syllable count judgment and word production tasks. Durations of diphthong/tense vowel-liquid rimes associated with disyllabic judgments were found to be significantly longer than those associated with monosyllabic judgments. In addition, substantial variation in syllable-count judgments between and within speakers was observed. This relationship between syllable-count judgment and rime duration has important implications for our understanding of the relation.

Session 2.6, Paper 2 (15:45-16:00)

The tune drives the text: Schwa in consonant-final loan words in Italian

Grice, Martine; Savino, Michelina; Caffo, Alessandro and Roettger, Timo
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In Italian, consonant-final loan words are reportedly produced with or without a final schwa. This paper reveals that variation in the presence of this schwa is dependent on a

number of factors, including the metrical structure of the target word and the voicing of the consonant. Crucially, it is also conditioned by intonation: Schwa is more likely to occur – and is acoustically more prominent – when the intonational tune is complex or rising, as opposed to falling. Schwa epenthesis can thus be seen as facilitating the production of functionally relevant tunes.

Session 2.6, Paper 3 (16:00-16:15)

Perturbation of stability patterns in syllable production
Hermes, Anne; Mücke, Doris and Auris, Bastian
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The present study is the first kinematic study to investigate the speech production of ET patients with VIM-DBS. More specifically, it explores the coordination patterns of articulatory gestures in syllables with simple and complex onsets, CV and CCV, in German. It provides a preliminary analysis of gestural coordination under stimulation for the target words /lima/ and /klima/ in the framework of Articulatory Phonology. The findings reveal a timing deficit in the phonetic realization of competing coupling relations for complex onsets for the patients. The observed perturbation of gestural phase relations can be related to the coupling hypothesis of syllable structure and are taken to be a symptom for dysarthria.

Session 2.6, Paper 4 (16:15-16:30)

Phonemic length and phrasal accent in Slovak consonantal and vocalic nuclei
Bucar Shigemori, Lia Saki; Pouplier, Marianne and Beňuš, Štefan
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Slovak allows us to compare vowels and consonants (/l/ and /r/) in nuclear position for their implementation of phonemic length contrast in stressed as well as unstressed syllables of accented as well as unaccented words. We analyzed the acoustic data of seven speakers for the changes in the duration of the vocalic and consonantal nuclei induced by phonemic length contrast and phrasal accent for both stressed and unstressed syllables. The difference between long and short nuclei was always robust, while phrasal accent only affected the long nuclei. Whether the nucleus was a vowel or a consonant did not matter except for the long nuclei in the unstressed syllable, where /l/ differed significantly from /e/ or /r/. Results are discussed also by taking into account what is known from the articulatory standpoint.

2.7: Cross-Linguistic Comparisons

Monday, August 10, 2015, 15:30-16:30, Dochart

Chair: Tamara Rathcke

Session 2.7, Paper 1 (15:30-15:45)

Prosodic signaling of information and discourse structure from a typological perspective
Karlsson, Anastasia; House, David and Svantesson, Jan-Olof
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This study investigates the relationship between prosody

and information/discourse structure in spontaneous spoken folk tales in the tonal Mon-Khmer language Northern Kammu, a language that behaves as a typical phrase language where available boundary tones are enhanced to mark information structuring. Topic is always placed before Comment by syntactic movement if necessary. There is a prosodic signaling of the boundary between Topic and Comment. Discourse structure is reflected in prosody, and we find higher boundary tones near the boundaries between Discourse Units. The results are discussed in terms of a typology of spoken discourse.

Session 2.7, Paper 2 (15:45-16:00)

Deriving manner of articulation classes from phoneme co-occurrence frequencies

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This paper looks into the possibility of deriving manner of articulation classes from phoneme co-occurrence frequencies. We show that distance measures based on phoneme co-occurrence frequencies group abstract manner of articulation classes that participate in phonological processes in spite of high acoustic and articulatory variability, e. g: obstruents, liquids, approximants, etc. The test language is Brazilian Portuguese, as represented by two large phonemicized corpora. Phonetically meaningful groups of phonemes emerge from the statistical analysis of co-occurrence frequencies of types and tokens of phoneme pairs. The techniques employed are cluster analysis and multidimensional scaling. Results show consistent groupings across corpora, counts, and statistical techniques. Besides consonants and vowels, co-occurrence frequencies satisfactorily separate the major classes, as well as some smaller manner of articulation subclasses.

Session 2.7, Paper 3 (16:00-16:15)

Cross-linguistic articulation rate among near-balanced bilinguals and implications for second language fluency measurement

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The present study examines cross-linguistic articulation rates in read speech among 28 native speakers (14 English and 14 Japanese) and 14 Japanese-English near-balanced bilinguals. The results show that: (1) articulation rates are comparable between the native speakers and the bilinguals; (2) there was a significant difference of articulation rates in Japanese and English among the bilinguals; (3) there is a strong positive correlation between English and Japanese articulation rates among bilinguals. Implications for development of L2 fluency measurement using the L1 fluency as a baseline are discussed.

Session 2.7, Paper 4 (16:15-16:30)

Cross-linguistic differences between accented vs unaccented vowel durations

Mairano, Paolo; Santiago, Fabian and Romano, Antonio

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This study compares durational measures of accented vs unaccented vowels for data of 5 languages (4 speakers per language read translations of the same passage). Results

show clear cross-language differences: accented vowels in our data of British English are more marked in terms of duration than in data of Mexican Spanish and Parisian French (data of German and Italian take a somewhat intermediate position). Direct durational measures of accented vs unaccented vowels yield a useful insight in aspects of speech rhythm that are only partially addressed by global measures of V variability (as provided by various popular rhythm metrics). Such results may have implications in rhythm typology and might help understand why stresses are perceived to occur at roughly regular intervals of time in so-called stress-timed languages.

08:00-18:00	Registration (<i>Hall 1</i>) and Exhibition (<i>Hall 2</i>)		Speaker room (<i>Etive</i>)				
09:00-09:30	OPENING CEREMONY (<i>Clyde Auditorium</i>)						
09:30-10:30	PLENARY Lecture 1 (<i>Clyde Auditorium</i>) The relation between language users' perception and production repertoires Prof Patrice Speeter Beddor						
10:30-11:30	COFFEE break (<i>Halls 1 & 2</i>)						
11:30-12:30	PLENARY Lecture 2 (<i>Clyde Auditorium</i>) Big issues in speech perception: Abstraction and nativeness Prof Anne Cutler						
12:30-14:00	LUNCH		IPA Exec, JIPA Ed CUP meeting (<i>Fyne</i>)				
14:00-15:00	ORAL Session 1 1.1 Phonetics of Korean 1.2 Coronals 1.3 Voicing Patterns 1.4 Lexical F0 and Focus 1.5 Speech Perception I 1.6 Sociophonetics I 1.7 Topics in Speech Production						
15:00-15:30	COFFEE break (<i>Halls 1 & 2</i>)						
15:30-16:30	ORAL Session 2 2.1 Gestural Coordination 2.2 Production of Liquids 2.3 Influences on L2 Learning 2.4 Tone and Tonal Contrasts 2.5 Language Change 2.6 Phonetics-Phonology Interface I 2.7 Cross-Linguistic Comparisons						
16:40-18:10	DISCUSSANT Session 1 D1.1 Phonation and voice quality D1.2 Phonetics-phonology interface and laboratory phonology Dr Christian DiCanio Prof Katarzyna Dziubalska-Kołaczyk Prof Bryan Gick Dr Andrew Wedel Dr Yi Xu D1.3 Speech production and articulatory phonetics D1.4 Sound change and speech evolution D1.5 Tone and intonation						
18:15-20:00	WINE RECEPTION (<i>Glasgow Science Centre</i>)						

DISCUSSANT SESSION 1

D1.1: Phonation and Voice Quality

Monday, August 10, 2015, 16:40-18:10, Carron

Chair: Bert Remijsen, Discussant: Christian Di Canio

Session D1.1, Paper 1 (16:55-17:10)

Contextually dependent cue weighting for a laryngeal contrast in Shanghai Wu

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Phonological categories are often differentiated by multiple phonetic cues. This paper reports a production and perception study of a laryngeal contrast in Shanghai Wu that is not only cued in multiple dimensions, but also cued differently on different manners (stops, fricatives, sonorants) and in different positions (non-sandhi, sandhi). Acoustic results showed that although this contrast has been described as phonatory in earlier literature, it is primarily a tone contrast. Phonation correlates only appear in fricatives, and tone sandhi neutralizes the f0 difference. Our perception results were largely consistent with the aggregate acoustic results, indicating that speakers adjust the perceptual weights of individual cues for a contrast according to contexts. These findings support the position that phonological contrasts are formed by the integration of multiple cues in a language-specific, context-specific fashion and should be represented as such.

Session D1.1, Paper 2 (17:10-17:25)

The role of voice quality in Shanghai tone perception

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This study investigates the perceptual aspect of voice quality in Shanghai Chinese. Previous studies show that breathy voice is a redundant feature of low tones, but tends to disappear in young speakers' productions. Does this mean that voice quality is not playing any role in tone perception? To find this out, we conducted forced-choice identification tests with young listeners, using synthesized and natural, breathy and modal syllables as stimuli. Our results show that breathy voice still is an important cue for the perception of low tone syllables, with the exception of nasal onset syllables.

Session D1.1, Paper 3 (17:25-17:40)

Perception of pitch in glottalizations of varying duration by German listeners

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Previous studies have shown that glottalization is not necessarily perceived as lower pitch but that pitch perception in glottalization can be influenced by the different size of prosodic domains relevant in the native language of the listener. Speakers of intonation languages were influenced

by the preceding pitch context when judging the pitch of longer creaky voice stretches, while speakers of pitch-accent or tone languages were not. The current study investigates pitch perception by German listeners in glottalized stretches of speech whose duration varied along a 10-step continuum. We found that the duration of the glottalized stretches affected the categorization of the stimuli, and that the German listeners were not influenced by the preceding pitch context, unlike in a previous study on longer stretches of glottalization of constant duration. Possibly shorter stretches of glottalization are interpreted as segmental word-boundary phenomena rather than as intonation.

Session D1.1, Paper 4 (17:40-17:55)

Coda glottalization in American English

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Glottalization of coda /t, p/ is a common process in American English. This study uses acoustic measures to determine when coda glottalization occurs in the conversational speech of the Buckeye Corpus. Vowels preceding coda /t, p/ tokens for 40 speakers were analyzed using H1*-H2*, an acoustic correlate of glottal constriction. Results indicate that coda glottalization is more common before a sonorant, and this effect is still found phrase-finally, even when phrasal creak is taken into account. Nonetheless, the process occurs in other environments. While we conclude that coda glottalization may occur to enhance the voicelessness of coda /t/ before sonorants [20, 28], we argue that this cannot fully explain the phenomenon.

D1.2: Phonetics-Phonology Interface and Laboratory Phonology

Monday, August 10, 2015, 16:40-18:10, Alsh

Chair: Elinor Payne, Discussant: Katarzyna Dziubalska-Kołarczyk

Session D1.2, Paper 1 (16:55-17:10)

Word-final (mor-)phonotactic consonant clusters in standard Austrian German

Leykum, Hannah; Moosmüller, Sylvia and Dressler, Wolfgang U.

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Morphonotactic consonant clusters originate through morphological operations and are mostly combinations of consonants across morpheme boundaries. As they are processed faster and acquired earlier than phonotactic clusters, it is hypothesised that in speech production, morphonotactic clusters are more robust and highlighted than phonotactic clusters. The present study pursues two goals: it examines a) whether word-final morphonotactic and phonotactic clusters are differentiated and b) whether within morphonotactic clusters, inflected verbs of the 2nd and 3rd person singular are distinguished. On a sample of 336 word-final morphonotactic and phonotactic consonant clusters of Standard Austrian German, an acoustic-phonetic analysis regarding relative duration and intensity of the cluster was performed. Additionally, duration of the preceding vowel

was measured. The analyses revealed no differences between morphonotactic and phonotactic clusters. Also, the expected distinction between clusters in verb forms in the 2nd and 3rd person singular could not be confirmed.

Session D1.2, Paper 2 (17:10-17:25)

Timing patterns of word-initial obstruent-sonorant clusters in Russian

*Marin, Stefania; Pouplier, Marianne and Kochetov, Alexei
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This study investigates intra-cluster timing patterns in Russian obstruent-sonorant clusters as a function of their segmental composition. The results confirm for Russian a velar-nasal (/kn, gn/) vs. velar-lateral (/kl, gl/) timing difference like the one reported for German [2], but this could not be extended to labial-lateral/nasal clusters (/vl, ml/ vs. /vn, mn/), which were all timed similarly. In addition, place of articulation of C1 (velar vs. labial) determined different timing patterns when C2 was a nasal (longer lags for /kn, gn/ than for /vn, mn/), but not when C2 was a lateral (/pl, bl, kl, gl/). The results support a place of articulation order effect [3] for obstruent-nasal but not for obstruent-lateral clusters. The pattern of results was robust across two speaking rates. We discuss how aerodynamic and perceptual requirements on intra-cluster timing may explain the patterns observed.

Session D1.2, Paper 3 (17:25-17:40)

The influence of preceding consonant on perceptual epenthesis in Japanese

*Hume, Elizabeth; Hall, Kathleen Currie and Mattingley, Wakayo
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Research on perceptual epenthesis in Japanese has revealed high back [ɯ] to be the vowel commonly perceived in illicit consonant sequences. However, loanword studies suggest that there are three epenthetic vowels, which reflect phonotactic restrictions on certain consonant + vowel sequences. Expanding previous perception studies, this paper investigates the extent to which perceptual epenthesis in Japanese is also constrained by the language's phonotactic patterns. In particular, we seek to determine to what extent the preceding consonant influences perceptual epenthesis, reflecting native phonotactics. Our results show that the preceding consonant does influence the vowel perceived yet, at the same time, there is a strong bias toward perceiving [ɯ] in contexts not predicted by the language's phonotactic patterns.

Session D1.2, Paper 4 (17:40-17:55)

Acoustics characteristics of open transition in nonnative consonant cluster production

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In cross-language speech production, nonnative consonant clusters are often modified by epenthetic or transitional vowels. Focusing on English speakers' productions of nonnative stop-initial clusters (e.g., /bn/, /bd/), the present study identified several acoustic characteristics that distinguish cases of epenthesis from accurate cluster realizations. Both modified and accurate productions contained an open transition between the initial stop and following consonant, but

epenthesis transitions had longer durations and other properties indicating greater vocal tract opening. Time course analyses revealed that the acoustic markers of epenthesis were present throughout the transition but became more pronounced following stop burst/frication. The acoustic measures studied here are simple, largely automatic, and provide a means to supplement or replace hand-coding of cluster production accuracy with statistical classification. The combination of semi-automatic measurement and machine learning makes the phonetic study of nonnative cluster production more objective and scalable, and could be extended to the investigation of transitional vowels more generally.

D1.3: Speech Production and Articulatory Phonetics

Monday, August 10, 2015, 16:40-18:10, Clyde

Chair: James M. Scobbie, Discussant: Bryan Gick

Session D1.3, Paper 1 (16:55-17:10)

A lip protrusion mechanism examined by magnetic resonance imaging and finite element modeling

*Li, Teng; Honda, Kiyoshi; Wei, Jianguo and Dang, Jianwu
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The lips are regarded as a paired organ for audiovisual speech communication that modulates speech sound and facial shape together in speech production. Despite the long research, the mechanism of lip protrusion is still an open question. This study aims at exploring physiological mechanisms of lip protrusion based on muscle visualization and finite element simulation of lower lip deformation. A special focus is placed on the peripheral part of the orbicularis oris among the lip muscles because it is located closer to the lip's oral surface. This geometry suggests enhancement of lip tissue convexity by medial shortening the teeth-side lip tissue disproportionately. This hypothesis is examined by a simulation using a finite element model of the lower lip based on high-resolution magnetic resonance imaging (MRI) data. Lower lip deformation obtained by the simulation conforms to the hypothesis of lip tissue advancement with enhanced anterior convexity.

Session D1.3, Paper 2 (17:10-17:25)

Decoupling functional units in speech production using auditory startle

*Chiu, Chenhao and Gick, Bryan
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Functionally defined neuromuscular structures, or modules (e.g., agonist-antagonist pairings), may be decoupled when elicited by a startling auditory stimulus (SAS), revealing possible lower-level functional units. The current study examines lip kinematics in SAS-induced responses and uses a 3D FEM biomechanical model to simulate the temporal interaction between facial muscles used in speech. Results show that SAS-elicited bilabial production is subject to displacement discontinuity (i.e., velocity change); this displacement discontinuity appears to be accounted for by the face model simulation results showing temporally decoupled coordination across neuromuscular modules. These

findings suggest possible lower-level neuromuscular modules for speech movements that may correspond with long-described articulators in speech production.

Session D1.3, Paper 3 (17:25-17:40)

How can speech production skills be predicted from visual, auditory, and haptic perception skills?

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How does speech production relate to speech perception? To investigate the most suitable perceptual factors to predict the production skills of a speaker, we determined the visual acuity for speech movements, the auditory acuity for speech sounds, and the haptic acuity of speech organs, following equivalent protocols in all three modalities. These abilities were linked to the individual's distinctness of articulation. We tested 26 German cochlear implant wearers and a normal hearing control group of matching age and gender. Our data suggest that in normal hearers, visual, auditory, and haptic skills are suitable to predict the production performance. However, this result could not be confirmed for cochlear implant wearers. Compared with the control group, cochlear implant wearers produced significantly less distinct sibilants [s] and [ʃ], but some of them performed surprisingly well in the test for auditory acuity for sibilants.

Session D1.3, Paper 4 (17:40-17:55)

The contribution of auditory feedback to corrective movements in vowel formant trajectories

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How much does auditory feedback shape the trajectory of a spoken utterance? When auditory feedback is altered experimentally, speakers make compensatory vocal adjustments that serve to correct for the alteration. However, it is unclear to what degree the sound of one's own voice is used to guide speech movements in more natural contexts. In this study, we compared the formant trajectories of monosyllabic words spoken in different levels of masking noise. Spoken vowels exhibited a "centering" effect in which formants that started out at the periphery moved to the center (median) with time. This effect occurred across all speakers and all noise conditions, although it was greatest in quiet and smallest in masking noise, when auditory feedback was not available. This finding suggests that auditory feedback substantially contributes to an ongoing corrective process in natural speech, although it is not the sole driver of vowel centering.

D1.4: Sound Change and Speech Evolution

Monday, August 10, 2015, 16:40-18:10, Forth

Chair: James Kirby, Discussant: Andrew Wedel

Session D1.4, Paper 1 (16:55-17:10)

Investigating variation in English vowel-to-vowel coarticulation in a longitudinal phonetic corpus

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Understanding the nature of individual variation in speech, particularly the mechanism underlying such variability, is increasingly important, especially for research on sound change, since such investigations might help explain why sound change happens at all and, conversely, why sound change is so rarely actuated even though the phonetic preconditions are always present in speech. The present study contributes to the literature on inter-and intraspeaker variation in coarticulation, a major precursor to sound change, by focusing on the degree of coarticulation stressed vowels have on neighboring unstressed vowels using recordings from a longitudinal phonetic corpus of oral arguments before the Supreme Court of the United States. Significant inter-speaker variation in height coarticulation, both anticipatory and carryover, is observed, while no evidence for systematic inter-speaker variability in backness coarticulation is found. There is also no evidence for intra-speaker variation in coarticulation over the course of 205 days.

Session D1.4, Paper 2 (17:10-17:25)

The effect of word frequency on the timecourse of tonogenesis in Seoul Korean

Bang, Hye-Young; Sonderegger, Morgan; Kang, Yoonjung; Claryards, Meghan and Yoon, Tae-Jin
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Seoul Korean is currently undergoing a tonogenetic sound change wherein the traditional consonantal VOT cue has been replaced by the previously intrinsic f0 of the following vowel. This study makes use of a recently available apparent-time corpus of speech to examine how this change has unfolded across the lexicon. In particular, we examine the effect of word frequency to determine whether the origin of the change can be found in reduction of high frequency (presumably hypo-articulated) words, or enhancement of low frequency (presumably hyper-articulated) words. Our results suggest that tonogenesis in Seoul Korean originated in words with high frequency, indicating a likely reduction-driven sound change. Furthermore, we find a parallel change between VOT and f0 over time, which signals that the loss of the VOT contrast proceeds in tandem with the enhancement of the f0 contrast, largely consistent with theories of adaptive behaviour of sound change.

Session D1.4, Paper 3 (17:25-17:40)

Trajectories of voice onset time in spontaneous speech on reality TV

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Do speakers' accents change from day to day? This paper examines this question through the lens of voice onset time (VOT). We examine whether VOT within individual speakers shows time dependence—daily fluctuations, longer-term time trends, or both—by examining spontaneous speech from 11 English speakers on three months of the reality TV show Big Brother UK. We build statistical models of time dependence in VOT for each speaker, controlling for a range of other factors, and find that all speakers show daily fluctuations in VOT, for both voiced and voiceless stops, while longer-term time trends (weeks–months) are present in about half of cases. Together with previous work, these re-

sults suggest that pronunciation (at least VOT) does change from day to day, possibly due to accumulated accommodation effects, but that these shifts often do not accumulate into longer-term change.

Session D1.4, Paper 4 (17:40-17:55)

Word-level distributions and structural factors codetermine GOOSE fronting

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We analyse dynamic formant data from a corpus of Derby English spanning three generations, focusing on the relationship between yod-dropping and GOOSE (/u:/)-fronting. Derby English exhibits a stable but variable pattern of yod-dropping in postcoronal position (e.g. new [nju:]~[nu:]), and an ongoing process of /u:/-fronting. The degree of /u:/-fronting is highest in words which categorically include yod (e.g. cube) and lower in words which never show a yod (e.g. noodle). Words with variable yod-dropping exhibit intermediate degrees of fronting. The degree of fronting in variable words is partly determined by how frequent the lexical item is: frequent words undergo more fronting than infrequent words. Although this result can be attributed to increased coarticulation with yod in frequent forms, it also affects tokens where the yod is absent. We suggest that these results provide evidence for phonetic coherence at the level of the word as well as phoneme and allophone categories.

D1.5: Tone and Intonation

Monday, August 10, 2015, 16:40-18:10, Dochart

Chair: Marc Brunelle, Discussant: Yi Xu

Session D1.5, Paper 1 (16:55-17:10)

The effect of cognitive load on tonal coarticulation

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Cognitive load (CL) has been found to influence language perception in many interesting ways, but its role in production has not been explored. In this paper, we look at how CL influences production of tonal coarticulation in Mandarin Chinese. Since coarticulation has been found to involve cognitive planning, this is an especially appropriate domain for investigating the influence of CL. Results indicate that the overall effect of CL on coarticulation was weak, but that anticipatory coarticulation of the dissimilatory variety increased somewhat under CL preceding a tone with a low f0 onset. These results suggest that anticipatory raising, or 'upstep', may involve a separate cognitive mechanism which is not common to all types of tonal coarticulation.

Session D1.5, Paper 2 (17:10-17:25)

Phonetic effects of speaking style on final rises in German questions and statements

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Potential intonational means to distinguish questions from statements in German are typically attributed to some sort

of final rising pitch [10, 24, 30, 36]. However, final rises are neither characteristic for every question type (e. g. wh-questions, alternative questions) nor compulsory in any [25, 32, 34]. Furthermore, they are frequently associated with non-final statements and thus not restricted to questions [10, 24, 30, 36]. Therefore, final rises are not reliable cues to interrogativity. Recent studies suggest that phonetic aspects of intonation can contribute to resolve the underspecified nature of the tonal structure [27, 28, 33]. A reading task shows that questions are phonetically distinguishable from continuous statements by a higher excursion of the final rise [27]. This paper reports two experiments showing that this finding also holds for controlled spontaneous speech.

Session D1.5, Paper 3 (17:25-17:40)

A case study of tone and intonation in two Tibetic language varieties

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This paper presents a case study looking at the interaction between lexical tone and post-lexical intonation in two very similar Tibetic language varieties spoken in Nepal: Lamjung Yolmo and Kagate. In these two varieties, we find preliminary evidence that in both monosyllabic and disyllabic words, lexical tone is only specified at the left edge of the word, while the right edge of the word is 'free' to take post-lexical intonation tones. We present evidence of post-lexical intonation on these 'free' right edges both phrase medially and phrase finally. These results suggest that a description of the tone system of these languages without reference to the intonational system is too simplistic, and any future analyses should incorporate descriptions of both lexical tone and post-lexical intonation.

Session D1.5, Paper 4 (17:40-17:55)

Focus placement on adjacent words in yes/no questions

Howell, Jonathan

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Semantic theory predicts four different focus configurations for a pair of adjacent words: early, late, broad and double focus. We report on a production study which confirms that speakers make a significant, though non-obligatory, distinction between the four categories. The distinction is observed in yes/no question and so cannot be associated with a specific intonational tune. The results also fail to support theories of focus projection and uniquely syntagmatic models of prominence.

DAY 2: Tuesday, August 11, 2015

ORAL SESSION 3**3.1: Phonetics of Celtic Languages***Tuesday, August 11, 2015, 09:00-09:45, Carron 1**Chair: Claire Nance*

Session 3.1, Paper 1 (09:00-09:15)

Comparison of fundamental frequency in Welsh and English in bilingual speech*Ordin, Mikhail and Mennen, Ineke
mikhail.ordin@gmail.com*

The study presents the results of cross-linguistic differences in speaking fundamental frequency in Welsh and English in bilinguals' speech. The findings established significant cross-linguistic differences between pitch profiles of Welsh and English. Welsh is produced with a wider pitch span. The increase in F0 span is achieved by higher F0 maxima in tone units. This result is not dependent on differences in anatomical constitution of the speakers. These differences are consistent across female bilinguals. The detected within-speaker differences in pitch profiles can be attributed to sociolinguistic factors.

Session 3.1, Paper 2 (09:15-09:30)

On the correlation of acoustic vowel and coda duration in modern Welsh C(C)VC monosyllables*Grawunder, Sven; Asmus, Sabine and Anderson, Cormac
grawunder@eva.mpg.de*

This project investigates the relationship of vowel duration and coda duration in modern Welsh monosyllabic words ending in a simplex consonant. Acoustic data from 16 native speakers from the two major dialectal varieties of Welsh were analysed. We found vowel duration highly predictive by coda duration, taking into account possible influences of phrase prosody, speaker and variety specific deviations. Also, prosodic prominence primarily appears to effect coda duration in Welsh.

Session 3.1, Paper 3 (09:30-09:45)

Preaspirated stops in the English of Scottish Gaelic-English bilinguals*Clayton, Ian
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Preaspirated voiceless stops, a well-documented feature of Scottish Gaelic, have also been anecdotally observed in the English spoken in the Scottish Hebrides island chain. This paper presents the first sociophonetic study of preaspirated stops in Hebrides English. Analysis of speech produced by

24 male and female Gaelic-English bilinguals aged 19-75 found that, while most participants produced at least some tokens of preaspiration, only older female speakers from the island of Lewis preaspirated the majority of their voiceless stops. These findings suggest that preaspiration is both geographically concentrated in Lewis and an obsolescent feature in Hebrides English generally. The effects of place of articulation, vowel quality, and stress on the duration and frequency of preaspiration are also discussed.

3.2: Clinical Phonetics: Voice and Prosody*Tuesday, August 11, 2015, 09:00-09:45, Carron 2**Chair: Anja Lowit*

Session 3.2, Paper 1 (09:00-09:15)

Phonation stabilisation time as an indicator of voice disorder*Schaeffler, Felix; Beck, Janet and Jannetts, Stephen
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There is increasing emphasis on use of connected speech for acoustic analysis of voice disorder, but the differential impact of disorder on initiation, maintenance and termination of phonation has received little attention. This study introduces a new measure of dynamic changes at onset of phonation during connected speech, phonation stabilisation time (PST), and compares this measure with conventional analysis of sustained vowels. Voice samples obtained from the KayPENTAX Disordered Voice Database were analysed (202 females, 128 males) including 'below threshold' voices where there was a clinical diagnosis but acoustic parameters for sustained vowels were within the normal range. Female disordered voices showed significantly longer PST duration than normal voices, including those in the 'below threshold' group. Overall differences for male voices were also significant. Results suggest that, at least for females, PST measurement from connected speech could provide a more sensitive indicator of disorder than traditional analysis of sustained vowels.

Session 3.2, Paper 2 (09:15-09:30)

Glottal area patterns in numerically simulated diplophonia*Schoentgen, Jean and Aichinger, Philipp
jschoentgen@ulb.ac.be*

The presentation explores diplophonia via numerical simulations of glottal vibrations. The aim of the study is to improve the understanding of glottal wall vibration and area waveform patterns of non-modal phonation as observed via laryngeal high-speed videos. Diplophonia has been described as the simultaneous perception of two pitches during voicing. A broader definition is the vibration of different glottal structures at two different frequencies. Simulations and direct observations suggest that glottal entrance-exit, left-right as well as anterior-posterior frequency asymmetries cause qualitatively distinct glottal pulse patterns. Additional results show that glottal entrance-exit and anterior-posterior phase shifts of single-frequency vibrations may cause double pulsing as well as spectral subharmonics. This

suggests that definitions based on pulse counting within glottal metacycles or detecting spectral sub-harmonics are too broad to enable distinguishing glottal frequency from glottal phase asymmetries.

Session 3.2, Paper 3 (09:30-09:45)

Retrospective longitudinal acoustic and perceptive study of substitution voice after partial laryngectomy
Crevier Buchman, Lise; Roques, Emeline and Audibert, Nicolas
Lise.buchman@numericable.fr

The goal of this longitudinal study in substitution voice after vertical and horizontal partial laryngectomy was i) to analyse perceptual and acoustic characteristics related to specific surgery, ii) to determine relevant acoustic measurements to classify voice quality. 30 male patients were recorded at 3, 6 and 12 months after surgery and 15 male controls. Two perceptual scales (GRB & IINFVo) were compared for relevance mean. Vowel [a, e, i, o, u] identification test was compared to acoustic analysis of the vocalic triangle to better understand the confusions. Long Term Average Spectrum (LTAS) could measure energy distribution in noisy voices. The first six months can be considered as an adaptation period for voicing features and improvement of breathy voice quality. Overlapping formant frequencies could explain the vocalic perceptual confusions. Voice and speech are better preserved with at least one vocal fold and the remaining of 2 arytenoids for neoglottic closure efficiency.

3.3: Aspects of Rhythm

Tuesday, August 11, 2015, 09:00-09:45, Boisdale 1

Chair: Hugo Quené

Session 3.3, Paper 1 (09:00-09:15)

Rhythm in Korean verse, sico

Jeon, Hae-Sung
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Although rhythm in language and speech is elusive, the prosodic pattern in verse and the way language is aligned to music can reveal cross-linguistic differences in rhythm. This paper presents an analysis of the temporal patterning in the Korean verse sico /sit̚o/ and its sung performance. The conclusion is that the sico rhythm does not exclusively suggest that Korean is syllable-based as claimed in psycholinguistic literature. Although the syllable can be a useful unit for segmenting speech, the primary building block for temporal organisation of sico is the word-sized prosodic unit resembling the Accentual Phrase.

Session 3.3, Paper 2 (09:15-09:30)

Spanish-accented English is Spanish to English-learning 5-month-olds

Paquette-Smith, Melissa and Johnson, Elizabeth K.
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Infants use prosody to distinguish between rhythmically-distinct languages, but in multilingual settings infants often encounter speakers who learned one or more of their languages later in life. Late learners of a language typically carry over the timing of their L1 into their L2. Can infants tell

when a single heavily-accented speaker switches between two rhythmically-distinct languages? Or do infants have difficulty tracking which language this person is speaking? Here, we address this question by examining 5-month-olds' ability to discriminate native Spanish from English speech samples produced by either a L2 English speaker (Experiment 1) or a L1 English speaker (Experiment 2). Infants succeeded in discriminating the two languages in Experiment 2, but not in Experiment 1. This suggests that infants perceived the Spanish-accented English as more Spanish-like than English-like. These findings underscore the importance of considering real-world speaker-related language variability in models of infant speech perception and language development.

Session 3.3, Paper 3 (09:30-09:45)

Accent and beat matching: The correspondence of English stress and Japanese pitch in terms of textsetting
Hattori, Noriko
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This study investigates the relation between speech accent and musical beat in two languages of different accent types. 'Accent' is intended to refer to any type of prominence: stress in English and pitch in Japanese. Previous studies on English textsetting indicate a rather strong matching of linguistic accents and musical beat strength. In L2 acquisition, Japanese learners of English tend to substitute pitch height for the 'Strong-Weak/Weak-Strong' relation in English. This study examined whether Japanese High-Low pitch pattern would be equivalent to English trochee, and Japanese Low-High pitch pattern would be equivalent to English iamb in terms of textsetting. Selected vocal music scores were examined; the results suggest that English stress and Japanese pitch are not equivalent in terms of textsetting, while they may be in language learners' production.

3.4: Fricatives around the World

Tuesday, August 11, 2015, 09:00-09:45, Dochart 1

Chair: Alan Yu

Session 3.4, Paper 1 (09:00-09:15)

An acoustic study of fricatives in Temirgoy Adyghe

Paschen, Ludger
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This paper presents an acoustic study of voiceless fricatives in the Temirgoy dialect of the Adyghe language (North West Caucasian, Circassian). The Circassian languages are well-known for their large consonant inventories. Using data gathered on a field trip to the Caucasus, the analysis focusses on three acoustic properties: centre of gravity, standard deviation and general slope pattern. Results show that while most fricative pairs can be reliably distinguished via centre of gravity alone, the spectral characteristics of some pairs (most notably /ʃ, j/, /ʂʷ, χʷ/ and /h, χʷ/) are highly similar. For the typologically rare closed postalveolar fricatives /ʂ, ʂʷ/, both centre of gravity and standard deviation were found to be decisive acoustic cues.

Session 3.4, Paper 2 (09:15-09:30)

Aspiration in alveolar fricatives in Bodo

*Sarmah, Priyankoo and Mazumdar, Phunuma
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Aspirated fricatives are typologically rare in world's languages, occurring mostly in the Sino-Tibetan languages. However, they are hitherto unreported in the Tibeto-Burman languages spoken in North-East India. In this study we present data from Bodo, a Tibeto-Burman language spoken in Assam, India and argue that the Bodo voiceless alveolar fricative is an aspirated voiceless alveolar fricative. To substantiate our argument, we consider a set of acoustic analysis and compare the results with acoustic properties reported for Korean, as it attests an aspirated alveolar fricative. Results confirm that while aspiration duration and F1 onset follows the pattern reported for aspirated fricatives in Korean, intensity, H1-H2, centre of gravity and onset f0, do not have any patterns consistent with aspiration.

Session 3.4, Paper 3 (09:30-09:45)

Mehri ejective fricatives: An acoustic study

*Ridouane, Rachid; Gendrot, Cédric and Khatiwada, Rajesh
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Ejective consonants are not very common cross-linguistically. Even less common is the occurrence of ejective fricatives. This infrequency is generally attributed to the incompatibility of two aerodynamic requirements: a continuing flow of air to create noise frication and an increasing intraoral air pressure to implement ejectives. This study reports on an acoustic investigation of initial and intervocalic ejective fricatives in Mehri, a Modern South Arabian language spoken in Oman, and seeks to determine how this incompatibility is solved by the 5 subjects recorded. The analysis of different temporal and non-temporal parameters shows a high degree of variability in the way this contrast is implemented. Much of this variability is shaped by the position of the fricatives within the word.

3.5: Psychophonetics

Tuesday, August 11, 2015, 09:00-09:45, Boisdale 2

Chair: Laura Dilley

Session 3.5, Paper 1 (09:00-09:15)

Articulatory consequences of prediction during comprehension

*Drake, Eleanor; Schaeffler, Sonja and Corley, Martin
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It has been proposed that speech-motor activation observed during comprehension may, in part, reflect involvement of the speech-motor system in the top-down simulation of upcoming material [14]. In the current study we employed an automated approach to the analysis of ultrasound tongue imaging in order to investigate whether comprehension-elicited effects are observable at an articulatory-output level. We investigated whether and how lexical predictions affect speech-motor output. Effects were found at a relatively early point during the pre-acoustic phase of articula-

tion, and did not appear to be predicated upon the nature of the phonological-overlap between predicted and named items. In these respects effects related to comprehension-elicited predictions appear to differ in nature from those observed in production and perception experiments.

Session 3.5, Paper 2 (09:15-09:30)

Processing relationships between language-being-spoken and other speech dimensions

*Vaughn, Charlotte and Bradlow, Ann R.
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While indexical information is implicated in language processing, little is known about the internal structure of the system of indexical dimensions itself, particularly in bilinguals. A series of three experiments using the speeded classification paradigm investigated the relationship between various indexical and non-linguistic dimensions of speech in processing (talker identity, talker gender, and amplitude of speech) and a lesser-studied indexical dimension relevant to bilinguals, namely, which language is being spoken. Results demonstrate that language-being-spoken is integrated in some form with each of the other dimensions tested, and that this relationship is independent of listeners' bilingual status.

Session 3.5, Paper 3 (09:30-09:45)

Compensatory and adaptive responses to real-time formant shifts in adults and children

*Terband, Hayo and van Brenk, Frits
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Auditory feedback plays an important role in speech motor learning. Previous studies investigating auditory feedback in speech development suggest that crucial steps are made in the development of auditory-motor integration around the age of 4. The present study investigated compensatory and adaptive responses to auditory perturbation in 4 to 9 year-old children compared to young adults (aged 19 – 29 years). Auditory feedback was perturbed by real-time shifting the first and second formant (F1 and F2) of the vowel /e:/ during the production of CVC words in a five-step paradigm (familiarization; baseline; ramp; hold; release). Results showed that the children were able to compensate and adapt in a similar or larger degree compared to the young adults, even though the proportion of speakers displaying a consistent compensatory response was higher in the group of adults. In contrast to previous reports, results did not show differences in token-to-token variability between children and adults.

3.6: Vowel Acoustics

Tuesday, August 11, 2015, 09:00-09:45, Alsh

Chair: Rachel Smith

Session 3.6, Paper 1 (09:00-09:15)

An acoustic study of monophthongs in Brunei Mandarin

*Xu, Shufang and Deterding, David
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This study provides an acoustic analysis of the mo-

nophthongs of Brunei Mandarin. Recordings were made of a short text by 20 Bruneian Chinese as well as 20 Beijing Chinese. Comparison of the scatter plots show that [i] and [y] are merged in Brunei Mandarin. This observation is quantified by calculating the Euclidean distance between the minimal pair nǐ [ni] and nǚ [ny] and the frequency of F3 of all open syllables with [i] and [y] in the text. The results confirm that [i] and [y] have a high degree of merger in Brunei Mandarin, while they tend to be distinguished in Standard Mandarin.

Session 3.6, Paper 2 (09:15-09:30)

Acoustic characteristics of clearly spoken English tense and lax vowels

*Leung, Keith King Wui; Jongman, Allard; Wang, Yue and Sereno, Joan A.
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The acoustic features of clearly produced vowels have been widely studied, but a less explored area concerns the difference in the adaptations of tense and lax clear vowels. This study explored the clear production of three pairs of English tense and lax vowels (/i-i/, /ɑ-ʌ/, /u-u/) to determine whether tense vowels show a larger clear versus conversational speech difference than lax vowels. Vowel space, individual formant frequency values, dynamic formant information and vowel duration of tense and lax vowels were examined. Results suggest there was more conversational-to-clear vowel lengthening for tense vowels than for lax vowels. However, an opposite effect was found for spectral measures. Lax vowels yielded greater vowel space expansion, formant frequency change, and dynamic formant movement than tense vowels in clear speech.

Session 3.6, Paper 3 (09:30-09:45)

Bark and Hz scaled F2 locus equations: Sex differences and individual differences

*Herrmann, Frank; Whiteside, Sandra and Cunningham, Stuart
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This study investigated speaker sex differences in F2 Locus equations (F2 LEs) based on linearly (Hz) and tonotopically (Bark) scaled formant measurements. F2 data based on English monosyllabic words produced by thirteen women and eleven men were tonotopically scaled [20, 21] and F2 LEs were derived for both the linear and tonotopically scaled formant values. Although the overall sex difference in the F2 LE slope values for women and men was significant for both sets of F2 measures, the magnitude of this difference decreased for the Bark (.047) compared to the Hz (.063) scale. The individual data revealed a significant correlation between the slope values of the Hz and Bark scale [$r = .974$; $p < .0001$] suggesting a lawful relationship between the two metrics. Further probing revealed that the F2 LE data from women were affected more by the Bark conversion than the data from men.

3.7: Information Status

Tuesday, August 11, 2015, 09:00-09:45, Dochart 2

Chair: Jürgen Trouvain

Session 3.7, Paper 1 (09:00-09:15)

Compression in post-verbal sequences in French

*Destruel, Emilie and Féry, Caroline
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This paper sheds light on the question of whether French resorts to post-focal compression (a reduction of pitch range), and the conditions under which it can do so. We present evidence from a production task in which thirteen native speakers of Standard French read scripted material; i.e. canonical sentences in which we manipulated the type of constituent found in post-verbal position (argument/adjunct), its prosodic length and complexity (short/simple or long/complex) and its informational status (focused/given). The study reveals two main findings: (i) arguments and adjuncts are phrased differently, and (ii) length and information structure exert a significant influence on the realization of "verb + adjunct" sequences. In the sequence "verb + argument", only a slight compression of the argument is found. We formalize these results by arguing that compression in French is more restricted than in Germanic languages; it can only take place at the level of the prosodic phrase.

Session 3.7, Paper 2 (09:15-09:30)

The effect of verbs on the prosodic marking of information status: Production and perception in German

*Röhr, Christine T; Baumann, Stefan and Grice, Martine
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The aim of the present paper is to investigate the encoding and decoding of informativeness of verbs in German. Pairs of target verbs and nouns were either semantically unrelated (i.e. new) or related to each other in different ways. In a production study using read speech, these differences in semantic relatedness were found to be expressed in the prosodic realisation of the target words, nuclear accents being more frequent on less related targets. This preference was reflected in appropriateness ratings in a follow-up perception study that controlled for nuclear accent placement. These results provide evidence for the informativeness of verbs and their relevance for the prosody of information packaging.

Session 3.7, Paper 3 (09:30-09:45)

Effects of contrastive intonation and grammatical aspect on processing coreference in Mainstream American English

*Schafer, Amy; Takeda, Aya; Camp, Amber; Rohde, Hannah and Grüter, Theres
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Coreference choices are influenced by multiple factors, including information structural categories such as topic and focus. These information structural categories can be indicated by intonation, yet few studies have investigated how

intonation affects subsequent choices for coreference. Using a story continuation experiment with aurally presented stimuli, we show that the location of contrastive focus in Mainstream American English significantly affects the preferred referent for the subject of the next sentence in a short discourse.

ORAL SESSION 4

4.1: Prosody of Questions

Tuesday, August 11, 2015, 11:30-12:30, Dochart 1

Chair: Haruo Kubozono

Session 4.1, Paper 1 (11:30-11:45)

Intonation and the pragmatics of yes-no questions in Central Catalan

Borràs-Comes, Joan and Prieto, Pilar
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The main aim of this paper is to test the claim that intonation plays an important role in the specification of dynamic epistemic commitments, i.e., speaker commitments to the speaker's own proposition and to the addressee's propositions. In an acceptability judgment task, 119 Central Catalan listeners were asked to rate the perceived degree of acceptability between a set of interrogative utterances (variously produced with one of four intonational contours) and their immediate discourse context (which was controlled for epistemic bias). We found that participants preferred some question intonation contours over others in specific epistemic contexts. That is, results show that question intonation encodes fine-grained information about the epistemic stance of the speaker, not only in relation to the speaker's own propositions but also in relation to the addressee's propositions.

Session 4.1, Paper 2 (11:45-12:00)

Question intonation in Hong Kong English: Interaction between Cantonese and English

Chen, Shuwen and Mok, Peggy Pik Ki
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Different sentence types are cued by various intonation patterns in English. Statements are uttered with a falling pitch while questions are cued by a raising pitch over the whole utterance. The intonation of questions in Cantonese, however, is signalled by a rising pitch at the second half of the last syllable. The current study investigates the intonation of statements and questions in Hong Kong English (HKE) to examine potential interaction of the two donor languages in HKE. Nineteen HKE speakers were recorded reading English and Cantonese sentences of different sentence types. Results showed that the intonation patterns of questions in HKE have mixed characteristics. They were cued by a final rising like Cantonese, but the rising was earlier than that in Cantonese, which may be affected by English.

Session 4.1, Paper 3 (12:00-12:15)

Acoustic correlates of Persian in-situ-wh-questions

Shamizadeh, Zohreh; Caspers, Johanneke and Schiller, Niels O.
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This experiment was designed to investigate whether the acoustic correlates of prosody of the pre-wh-part of the sentence differentiate in-situ-wh-questions from declaratives in Persian. To accomplish the purpose of this research 115 declaratives and 115 in-situ-wh-questions were constructed. These sentences were elicited from eight Persian native speakers in a sentence elicitation task. The contrast between the prosody of the pre-wh-part of the sentence in declaratives and in-situ-wh-questions appears to have clear acoustic correlates, which can be captured in terms of a higher pitch level and shorter duration of the pre-wh-part in wh-questions and a larger pitch excursion size of the word immediately preceding the wh-word. This finding provides evidence for the claim [14] that questions universally differ from statements in that the former have some element of high pitch that is absent in the latter. In addition, the result implies that the in-situ-wh-questions can potentially be distinguished from declaratives based on the prosody of the pre-wh-part of the sentence.

Session 4.1, Paper 4 (12:15-12:30)

On the acoustics of wh-exclamatives and wh-interrogatives: Effects of information structure and sex of speaker

Repp, Sophie
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In German, wh-questions and verb-second wh-exclamatives are string-identical and can only be distinguished by intonation. This study presents data from a production experiment where speakers produced contextualized questions and exclamatives, showing that the two sentence types differ in many acoustic measures throughout the clause. The results also indicate that the realization of both sentence types is context-dependent in terms of information structure: focus is marked both in wh-questions and wh-exclamatives. Finally, the study shows that female speakers mark the difference between exclamativity and interrogativity more strongly than male speakers do.

4.2: Vowel Production

Tuesday, August 11, 2015, 11:30-12:30, Alsh

Chair: Juraj Šimko

Session 4.2, Paper 1 (11:30-11:45)

Articulation of English vowels in running speech: A real-time MRI study

Proctor, Michael; Chi Yhun, Lo and Shrikanth, Narayanan
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16,105 vowels produced by three speakers of American English were examined using real-time MRI, to provide further insights into tongue shaping and articulatory contrast in stressed and unstressed positions in fluent speech.

High front vowels were found to maintain characteristic lingual postures in prosodically weak environments. Non-high vowels were articulated with a more raised dorsum and different pharyngeal constrictions in unstressed positions, compared to their stressed counterparts. The data reveal complex patterns of reduction, influenced by individual speaker vocal tract morphology, that resist simple characterization as 'centralization'.

Session 4.2, Paper 2 (11:45-12:00)

Articulatory variability and fricative noise in apical vowels

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Standard Mandarin (SM) apical vowels have tongue postures similar to the fricative consonants that obligatorily precede them, but are thought to lack the consonants' fricative noise. Lee-Kim [10] argues that in SM apical vowels, a slight reduction of constriction at the tongue blade or tip reduces fricative noise, essentially resulting in syllabic approximants. Using lingual ultrasound to examine articulation of apical vowels in SM, we argue that other articulatory adjustments may also limit frication in apical vowels, but that these strategies are implemented variably such that some speakers occasionally exhibit frication. This articulatory variety mostly maps to frictionless or approximant-like apical vowels in SM, but we find no reason to rule out fricativized apical vowels as possible phonetic segments in SM or other languages.

Session 4.2, Paper 3 (12:00-12:15)

Voiceless Greek vowels

Kaimaki, Marianna

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Previous studies on the acoustic properties of Greek vowels have indicated that they may have voiceless realisations in certain phonological contexts. Researchers have suggested that such devoicing is restricted to the high vowels /i/ and /u/ [7], [10]. Analysis of production data from 12 native Greek speakers suggests that devoicing is not restricted to the high vowels but that other vowels can also be produced voiceless in the appropriate phonological environment. The data indicates that voiceless vowels can be found utterance-finally after voiceless consonants, under two conditions: (1) the vowel must be unstressed and (2) the intonation contour associated with the word in which the vowel occurs must be falling (utterance-final voiceless vowels do not co-occur with final rising contours).

Session 4.2, Paper 4 (12:15-12:30)

Lingual differences in Brazilian Portuguese oral and nasal vowels: An MRI study

Barlaz, Marissa; Fu, Maojing; Dubin, Julianna; Liang, Zhi-Pei; Shosted, Ryan and Sutton, Brad

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It has been shown that oral and nasal vowel pairs can differ substantially in their oro-pharyngeal configuration (besides the position of the velum), an effect that may lead to the enhancement of certain acoustic features associated with nasalization. We use real-time MRI to compare the lingual configuration of oral and nasal vowels in Brazilian Por-

tuguese at various timepoints during the production of these vowels. Results of area function comparisons and smoothing spline ANOVAs indicate that lingual articulation of nasal vowels increasingly moves towards the center of the oral cavity throughout the duration of the vowel, whereas the lingual articulation of their oral counterparts moves towards the outer extrema. We conclude that the lingual configurations in these targets are in line with the effects of vowel nasalization on formant frequencies. This further reaffirms the possibility that oral articulation in nasal vowels may be employed to enhance the acoustic effects of nasalization.

4.3: Sounds of the World's Languages

Tuesday, August 11, 2015, 11:30-12:30, Carron 1

Chair: Adrian Simpson

Session 4.3, Paper 1 (11:30-11:45)

On Medumba bilabial trills and vowels

Olson, Kenneth and Meynadier, Yohann

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The Medumba consonant inventory includes plain and prenasalized bilabial trills /b, mb/, which contrast with bilabial stops. The trills occur most often before the central vowels /ɛ ə/, while they are not attested before /u/. The central vowel /ɛ/ has a vowel posture that is particularly conducive to trilling of the lips: it does not form a circular opening, the corners of the mouth are drawn slightly apart, the lips are tensed, particularly at the corners of the mouth, and there is a narrow aperture between the lips. This suggests that it is close lip aperture of the following vowel— rather than rounding—that provides the most conducive environment for bilabial trill production.

Session 4.3, Paper 2 (11:45-12:00)

An acoustic analysis of Sylheti phonemes

Gope, Amalesh and Mahanta, Shakuntala

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This paper examines the acoustic properties of Sylheti phonemes. Sylheti is generally regarded as one of the varieties of Bangla. The historical development of this language witnessed significant reduction and reconstruction of its phoneme inventory. The phoneme inventory is considerably reduced due to the phonological process of deaspiration [+spread glottis], spirantization and deaffrication (Gope & Mahanta, 2014). We conducted an acoustic experiment and measured the voiced onset time (VOT) of all the voiced stops. The result of one-way ANOVA did not show any significant interaction among the obstruents in terms of aspiration ($p > 0.05$, $[F(1, 359) = 0.095, p = 0.76]$). In a separate experiment, we examined the acoustic qualities of Sylheti vowels. Results confirm the presence of 5 vowels in Sylheti. A one way ANOVA confirmed significance effect on vowel quality in terms of duration [$F(4, 600) = 57.77, p = 0.00$] and (first three) formants values.

Session 4.3, Paper 3 (12:00-12:15)

Prestopped bilabial trills in Sangtam

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This paper discusses the phonetic and phonological features of a typologically rare prestopped bilabial trill and some associated evolving sound changes in the phonology of Sangtam, a Tibeto-Burman language of central Nagaland, northeast India. Prestopped bilabial trills were encountered in two dozen words of a 500-item corpus and found to be in phonemic contrast with all other members of the plosive series. Evidence from static palatograms and linguagrams demonstrates that Sangtam speakers articulate this sound by first making an apical- or laminal-dental oral occlusion, which is then explosively released into a bilabial trill involving up to three oscillations of the lips. The paper concludes with a discussion of the possible historical sources of prestopped bilabial trills in this language, taking into account phonological reconstructions and cross-linguistic comparisons.

Session 4.3, Paper 4 (12:15-12:30)

The vowel inventory of Roper Kriol

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Despite being the largest Indigenous Australian language, Kriol—an English-lexified creole spoken across the northern part of Australia—is still largely unexamined from an instrumental or phonological point of view. This hampers efforts to predict cross-linguistic difficulties experienced by Kriol speakers in English-language settings and crucially in predicting the difficulties that Kriol-speaking children face in learning Standard Australian English. We report here on the vowel inventory of Kriol, which has previously been claimed to have between five and seven monophthongs and three or four diphthongs ([19] [20]). We show that its vowel system is in fact a triangular five-vowel system, with a duration contrast, and a number of diphthongs. This system thus reflects, in certain respects, typical inventories of the Indigenous substrate languages, except that, by radically increasing the number of available phonemes, Kriol has managed to keep the majority of vowel contrasts of English intact.

4.4: Phonetics-Phonology Interface II

Tuesday, August 11, 2015, 11:30-12:30, Boisdale 1

Chair: Lisa Davidson

Session 4.4, Paper 1 (11:30-11:45)

Cues to gemination in word-initial position in Maltese

Galea, Luke; Hermes, Anne; Gatt, Albert and Grice, Martine
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In this study we investigated word-initial geminates in Maltese, focusing on sub-segmental acoustic durations: constriction duration and, where appropriate, VOT; and the duration of adjacent segments: the tonic vowel duration and the duration of the inter-consonantal interval spanning the word boundary. This latter interval, between the consonant in the previous word and the singleton/geminate consonant, is measured so as to capture the presence and duration of a vocalic element, which has been referred to as

epenthetic, and reportedly precedes word-initial geminates in the language. Whilst constriction duration plays an important role in distinguishing geminates from singletons (a ratio of 1.7:1), VOT does not. Moreover, although the duration of the following tonic vowel plays no role, the duration of the preceding context – the inter-consonantal interval – is a strong cue to gemination word-initially

Session 4.4, Paper 2 (11:45-12:00)

Pre-consonantal /s/-retraction

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In pre-consonantal position historical /s/ has changed to post-alveolar /ʃ/ in several different languages. This paper explores whether such cases of /s/ > /ʃ/ might share a common phonetic origin. We test whether /s/ is more retracted before /t/ in production and in perception. Production data show that word-medial /s/ has a lower first spectral moment (henceforth, M1) before /t/ than before vowels. Perception results show a bias towards retraction in pre-consonantal position.

Session 4.4, Paper 3 (12:00-12:15)

Prosodic strengthening on consonantal nasality and its asymmetric coarticulatory influence on vowel nasalization in CVN# and #NVC in English

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This study explores the relationship between prosodic strengthening and linguistic contrasts in English by examining temporal realization of nasals in CVN# and #NVC, and their coarticulatory influence on vowels. Results show that different sources of prosodic strengthening bring about different types of linguistic contrasts. Prominence increased N-duration ([nasality]) but the vowel's [orality] (rather than [nasality] due to coarticulation) even when the nasal was phonologically focused (e.g., mob-bob; bomb-bob). Boundary strength reduced the nasal's [nasality] in domain-initial position (enhancing its [consonantality]), while the opposite was true with the domain-final nasal. In dynamical terms, these results may be seen as coming from differential intergestural coupling relationships that may underlie the difference in V-nasalization in CVN# vs. #NVC. It is proposed that the timing initially determined by such relationships must be modulated by prosodic strengthening in a way that reflects the relationship between dynamical underpinnings of speech timing and linguistic contrasts.

Session 4.4, Paper 4 (12:15-12:30)

The role of vowel type, preceding consonant and lexical frequency on final vowel devoicing in Continental French

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Final vowel devoicing is a feature of Continental French in which utterance-final vowels lose their voicing and produce fricative-like whistles. Previous studies have examined the phenomenon's phonological and pragmatic tendencies, revealing its preference for high vowels in open syllables at the ends of statements. Here, we re-examine and expand upon

previous work by investigating the role of vowel type, preceding consonant and lexical frequency. Results reveal that high rounded vowels devoice more frequently than high unrounded ones, and that stops precede devoiced vowels at significantly higher rates than fricatives or sonorants. No significant effect was found for voicing in the preceding segment. A slight effect for lexical frequency was also found, such that words that were more frequent were more likely to be realized with a devoiced vowel. This suggests that although final devoicing is heavily predictable via phonological constraints, it also exists on the lexical level.

4.5: Memory and Speech

Tuesday, August 11, 2015, 11:30-12:30, Dochart 2

Chair: Alan Yu

Session 4.5, Paper 1 (11:30-11:45)

Using false memories to characterize lexical representations: A test case from English

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The English phoneme /t/ is realized as [t^h] word-initially ([t^h]ip), but in many dialects it exhibits free variation word-finally (ba[t] ~ ba[ɾ̩] ~ ba[ʔ]). We examined whether listeners construct false memories at different rates for these two different types of words. We presented listeners with lists of spoken phonological neighbors, such as lip, tin, type... (neighbors of tip) and fat, ban, bet... (neighbors of bat), followed by two different memory tasks, recall and recognition. Results indicate significantly lower rates of false memories for words like bat, and different patterns of recall versus recognition indicate that two separate mechanisms contribute to this result. We suggest that free variation creates qualitatively distinctive lexical representations which resist false memories.

Session 4.5, Paper 2 (11:45-12:00)

Episodic memory for words enhances the language familiarity effect in talker identification

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Speech perception and talker identification are intertwined. Speech from a single talker is recognized more efficiently than speech from multiple talkers; likewise, in the "language familiarity effect", talker identification is more accurate in one's native language than a foreign one. Models of speech perception implicate episodic memory to explain effects of phonetic variability. We investigated whether these models can also account for the language familiarity effect. Listeners learned to identify voices speaking English and Mandarin in conditions differentially favoring episodic memory: (1) all talkers repeated the same sentences and (2) each talker said completely unique sentences with no repeated words. The language familiarity effect was stronger when talkers' speech had identical content, suggesting that episodic lexical access enhances talker identification in a native language. Foreign-language talker identification did not differ

between the conditions, suggesting that episodic memory for voices is filtered by lexical abstraction possible only in a familiar language.

Session 4.5, Paper 3 (12:00-12:15)

Verbal and spatial working memory load have similarly minimal effects on speech production

Lee, Ogyoung and Redford, Melissa

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The goal of the present study was to test the effects of working memory on speech production. Twenty American-English speaking adults produced syntactically complex sentences in tasks that taxed either verbal or spatial working memory. Sentences spoken under load were produced with more errors, fewer prosodic breaks, and at faster rates than sentence produced in the control conditions, but other acoustic correlates of rhythm and intonation did not change. Verbal and spatial working memory had very similar effects on production, suggesting that the different span tasks used to tax working memory merely shifted speakers' attention away from the act of speaking. This finding runs contra the hypothesis of incremental phonological/phonetic encoding, which predicts the manipulation of information in verbal working memory during speech production.

Session 4.5, Paper 4 (12:15-12:30)

Categorical vs. episodic memory for pitch accents in English

Kimball, Amelia E.; Cole, Jennifer; Dell, Gary and Shattuck-Hufnagel, Stefanie

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Phonological accounts of speech perception postulate that listeners map variable instances of speech to categorical features and remember only those categories. Other research maintains that listeners perceive and remember subcategorical phonetic detail. Our study probes memory to investigate the reality of categorical encoding for prosody—when listeners hear a pitch accent, what do they remember? Two types of prosodic variation are tested: phonological variation (presence vs. absence of a pitch accent), and variation in phonetic cues to pitch accent (F0 peak, word duration). We report results from six experiments that test memory for pitch accent vs. cues. Our results suggest that listeners encode both categorical distinctions and phonetic detail in memory, but categorical distinctions are more reliably retrieved than cues in later tests of episodic memory. They also show that listeners may vary in the degree to which they remember prosodic detail.

4.6: Topics in Speech Production and Perception

Tuesday, August 11, 2015, 11:30-12:30, Boisdale 2

Chair: Tessa Bent

Session 4.6, Paper 1 (11:30-11:45)

A comparative study of Estonian Swedish voiceless laterals: Are voiceless approximants fricatives?

Asu, Eva Liina; Nolan, Francis and Schötz, Susanne

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Are voiceless approximants categorically distinct from voiceless fricatives? We address this question by means of an acoustic analysis of voiceless laterals in Icelandic, Welsh, and the endangered variety Estonian Swedish. All three have a voiceless lateral functioning in contrast to a voiced lateral approximant. The analysis focused on duration – including any period of voicing ('pre-voicing') just before the release of the lateral – and the intensity of the voiceless lateral relative to the following vowel. Welsh showed no pre-voicing in the lateral, whilst Icelandic and Estonian Swedish did, though the latter less consistently. The Welsh voiceless lateral was also greater in relative intensity. This could be taken as a difference of phonetic category between a fricative [t̪] in Welsh as against a voiceless approximant [l̪] in the other two languages, but we argue that the complexity of the data from Estonian Swedish excludes a categorical interpretation.

Session 4.6, Paper 2 (11:45-12:00)

Reduction of obstruent-liquid-schwa clusters in casual French

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This study investigated pronunciation variants of word-final obstruent-liquid-schwa (OLS) clusters in casual French and the variables predicting the absence of the phonemes in these clusters. In a dataset of 291 noun tokens extracted from a corpus of casual conversations, we observed that in 80.7% of the tokens, at least one phoneme was absent and that in no less than 15.5% the whole cluster was absent (e.g., /mis/ for ministre). Importantly, the probability of a phoneme being absent was higher if the following phoneme was absent as well. These data show that reduction can affect several phonemes at once and is not restricted to just a handful of (function) words. Moreover, our results demonstrate that the absence of each single phoneme is affected by the speaker's tendency to increase ease of articulation and to adapt a word's pronunciation variant to the time available.

Session 4.6, Paper 3 (12:00-12:15)

The gradient effect of transitional magnitude: A source of the vowel context effect

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The present study examines the role of transitional magnitude in the identification of consonant place. Transitions in the three vowels /u a e/ following the alveolo-palatal sibilant /ç/ in Polish were systematically manipulated and used as a gradient variable. In an identification task, native Polish speakers were given a choice between /ç/ and /ʂ/ for stimuli with varying levels of palatal transitions. The results showed that greater transitions elicit significantly more palatal responses in all vowel contexts. More interestingly, retracted vowels with greater palatal transitions were shown to provide more robust transitional cues than front vowels with weaker transitions.

Session 4.6, Paper 4 (12:15-12:30)

Non-native discrimination across speaking style, modality, and phonetic feature

Fenwick, Sarah; Best, Catherine and Tyler, Michael

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Discriminating between certain non-native contrasts can be difficult. The Perceptual Assimilation Model [1] predicts that when two non-native phones are assimilated to the same native language category, as equally good or poor versions, discrimination should be poor (a single-category assimilation). However, it is not known to what extent visual and/or clearly articulated speech might assist cross-language speech perception. Monolingual Australian English listeners discriminated two single-category Sindhi consonant contrasts (/t/-/ʈ/, /b/-/ɖ/), across auditory-only (AO) and auditory-visual (AV) conditions, in clear and citation speech. For /b/-/ɖ/ (a laryngeal feature difference), AV contrasts were discriminated more accurately than AO contrasts in citation speech, but not in clear speech, while for /t/-/ʈ/ (a place-of-articulation difference) there was AV benefit for clear, but not for citation speech. These results highlight that while perceivers attempt to utilize even subtle gestural differences, speaking style and modality differentially contribute to the success of discriminating across non-native contrasts.

4.7: Vowel Perception in L2

Tuesday, August 11, 2015, 11:30-12:30, Carron 2

Chair: Katerina Nicolaidis

Session 4.7, Paper 1 (11:30-11:45)

The role of vowel duration cue in L1: Effects on L2 learners' identification of phonological vowel length in Japanese

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This study investigated the effects of learners' L1 on their identification of Japanese phonological vowel length at three speaking rates. Native listeners of Japanese (NJ) and learners of Japanese with L1 backgrounds in Finnish (NFin), American English (NE), Russian (NR), and French (NFr) participated in the study. The results showed that the proportion of "long" responses increased as a function of vowel duration for all groups. Meanwhile, only NJ and NFin shifted the category boundary location according to speaking rate, which occurred at a shorter duration for a faster speaking rate. In addition, NFr's boundary width was significantly greater than NJ's and NFin's. These results suggest that L2 learners can access vowel duration as a cue regardless of their L1, but only those whose L1 uses vowel duration as a cue for phonological vowel length can shift the category boundary appropriately and identify L2 vowel length sharply as NJ do.

Session 4.7, Paper 2 (11:45-12:00)

L2 sound perception: Does orthography matter?

Nimz, Katharina and Khattab, Ghada

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In recent years, there has been growing interest in how L2 learners' perceptual abilities relate to their lexical representation of foreign words, and in how orthography may play a role in this. In this study we address both questions using two perception experiments that were concerned with the

discrimination and representation of German long vowels by Polish learners of L2 German and a native speaker control group. While the first experiment tested phonetic discrimination abilities using nonsense words, the second experiment was a judgement task that was designed to tap into the participants' lexical representations. Half of the test items in the judgement task were real words containing vowels that were explicitly marked for length in their orthography, while the remaining items were not explicitly marked. The findings of the two experiments are dissociated; interestingly, orthography did not seem to be the driving factor.

Session 4.7, Paper 3 (12:00-12:15)

Effects of musical experience on the Thai rate-varied vowel length perception

*Cooper, Angela; Wang, Yue and Ashley, Richard
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Musical experience has been demonstrated to play a significant role in the perception of non-native speech contrasts. The present study examined whether or not musical experience facilitated the normalization of speaking rate in the perception of non-native vowel length contrasts. Musicians and non-musicians were first briefly familiarized with Thai vowel length distinctions before completing identification and AX discrimination tasks with items contrasting in vowel length at three speaking rates. Results revealed that musicians significantly outperformed non-musicians at identifying and discriminating non-native rate-varying length distinctions, suggesting that their attunement to rhythmic and temporal information in music transferred to facilitating their ability to perceive non-native temporal speech contrasts at varying speaking rates.

Session 4.7, Paper 4 (12:15-12:30)

Perceptual assimilation and free classification of German vowels by American English listeners

*Daidone, Danielle; Krueger, Franziska and Lidster, Ryan
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In order to investigate listeners' perceptual patterns regarding segments from an unfamiliar language, researchers commonly employ perceptual assimilation tasks. These tasks investigate the perceptual similarity of non-native sounds to L1 sounds, but do not provide information on the perceived similarity among non-native sounds. In order to examine how German vowels are perceived by naïve American English listeners, both in their similarity to L1 vowels and to each other, this study employs a perceptual assimilation task and a free classification task, a tool previously used for investigating perceived (dis-)similarities of stimuli. The perceptual assimilation results largely replicate previous findings on American English assimilation of German vowels; however, the free classification results suggest that assimilation patterns are not reliable indicators of the German vowels' perceptual similarity to each other. These results indicate that free classification offers an efficient means of gathering corroborating data that can be used to enhance cross-linguistic perception research.

ORAL SESSION 5

5.1: Acoustic and Articulatory Variation

Tuesday, August 11, 2015, 14:00-15:00, Alsh

Chair: Leendert Plug

Session 5.1, Paper 1 (14:00-14:15)

Eliciting sociophonetic variation in vowel duration

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Recent work has revealed that regional dialect is an important source of systematic variation in vowel duration in American English in addition to the well-known linguistic sources of this variation. This study addressed the issue of adequacy of speech materials used to elicit the dialect-specific temporal patterns. Duration of vowels was measured in isolated citation-form syllables and in connected speech of the same male and female talkers representing three different American English dialects. Despite the differences in absolute duration, the pattern of duration differences for the selected vowels was similar for each dialect and gender across the two types of production. The study provides evidence that the high level of control does not obscure dialect- and gender-specific patterns. It is concluded that citation-form vowels produced in isolation (representing fine control over phonetic context) can be successfully utilized to obtain valid samples of sociophonetic variation in vowel duration

Session 5.1, Paper 2 (14:15-14:30)

Effects of age and hearing loss on articulatory precision for sibilants

*Koch, Xaver and Janse, Esther
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This study investigates the effects of adult age and speaker abilities on articulatory precision for sibilant productions. Normal-hearing young adults with better sibilant discrimination have been shown to produce greater spectral sibilant contrasts. As reduced auditory feedback may gradually impact on feedforward commands, we investigate whether articulatory precision as indexed by spectral mean for [s] and [ʃ] decreases with age, and more particularly with age-related hearing loss. Younger, middle-aged and older adults read aloud words starting with the sibilants [s] or [ʃ]. Possible effects of cognitive, perceptual, linguistic and sociolinguistic background variables on the sibilants' acoustics were also investigated. Sibilant contrasts were less pronounced for male than female speakers. Most importantly, for the fricative [s], the spectral mean was modulated by individual high-frequency hearing loss, but not age. These results underscore that even mild hearing loss already affects articulatory precision.

Session 5.1, Paper 3 (14:30-14:45)

Acoustic and articulatory variation in British Asian English liquids

Kirkham, Sam and Wormald, Jessica*s.kirkham@lancaster.ac.uk*

Previous auditory and acoustic research reports variation in /l/ between 'Asian' and 'Anglo' speakers of British English, with Asian speakers producing 'clearer' realisations of /l/ than Anglo speakers from the same geographical region [8, 11, 22]. Whilst research on /r/ in British Asian English suggests variable rhoticity [8, 9], less work has documented /r/ variation in this community in non-coda contexts. Additionally, no study to date has examined the articulatory realisation of liquids in British Asian English. This paper reports a study of liquid variation between Anglo and Asian speakers of Bradford English, a dialect of British English. We report acoustic and midsagittal B-mode ultrasound data on the realisation of /l/ and /r/ in word-initial and word-medial position. We find differences between Anglo and Asian speakers that support previous studies, but also find individual differences in articulation. We discuss our results with reference to language contact and sociophonetic variation in liquids.

Session 5.1, Paper 4 (14:45-15:00)

An acoustic and articulatory study of /l/ allophony in Newfoundland English*Mackenzie, Sara; De Decker, Paul and Pierson, Rosanna
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This paper reports on an acoustic and articulatory study of /l/ in Newfoundland, Canada. English spoken in Irish-settled areas of the province is reported to exhibit light /l/ in all positions, in contrast to the standard North American English pattern with dark /l/ in codas and light /l/ in onsets. Our study reports on /l/ productions from 9 male and 13 female speakers from across the province. /l/ productions were elicited preceding and following word boundaries (e.g. steal assets vs. see lapses). Articulatory measures of tongue body height and retraction were determined using ultrasound imaging and F2-F1 values were used as an acoustic measure of /l/ darkness. As a group, participants show the standard North American pattern with significantly darker /l/s in word-final position. There is significant variation among speakers, however, with some speakers failing to show a distinction between final and initial /l/ in the acoustic or articulatory measures.

5.2: Prosody around the World

Tuesday, August 11, 2015, 14:00-15:00, Boisdale 1

Chair: Sun-Ah Jun

Session 5.2, Paper 1 (14:00-14:15)

Downstep in Tswana (Southern Bantu)*Zerbian, Sabine and Kügler, Frank
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The article investigates the realization of adjacent high tones across word boundaries in Tswana, a Southern Bantu language. The results show that downstep, a lowering of the second in a series of adjacent high tones, takes place across word boundaries within the same phonological phrase. Downstep does not occur across phonological

phrase boundaries. The study confirms an empirical phenomenon and a phonological analysis previously suggested for Southern Sotho for the Tswana variety under consideration by providing quantitative details on the phonetic implementation of this prosodic phenomenon. Quantitative data is rarely presented for tonal phenomena in Bantu languages.

Session 5.2, Paper 2 (14:15-14:30)

Temporal patterns of quantity in Inari Saami*Türk, Helen; Lippus, Pärtel; Pajusalu, Karl and Teras, Pire
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The sound system of Inari Saami exhibits a three-way quantity contrast which is similar to some other Finno-Ugric languages – Estonian and Livonian – in several respects. In all these languages the domain of ternary quantity is a disyllabic foot where the first syllable is stressed and the second syllable is unstressed. In this study we investigate the realisation of the ternary quantity contrast in Inari Saami disyllabic words with phonologically short and long vowels or diphthongs as the nucleus of the first syllable. Our results show that in consonant duration the ternary distinction occurs after a short vowel. The opposition is binary after a short diphthong (consonant is either short or long) and after a long vowel or a long diphthong (consonant is either short or half-long). A vowel in the unstressed second syllable compensates for the length of the preceding vowel and consonant within the foot.

Session 5.2, Paper 3 (14:30-14:45)

What does the question sound like: Exploring wh- and yes/no interrogative prosody in Yami*Lai, Li-Fang and Gooden, Shelome
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This paper explores two types of interrogative prosody in Yami, an Austronesian language spoken in Taiwan. (Semi-) spontaneous data collected through the Map Task technique [1] were used and acoustic parameters such as pitch accent shapes, boundary tones, pitch range, and speech rate were examined. The results show that all parameters were used to differentiate interrogative prosody in Yami. The majority of the wh-questions have a falling intonation pattern (H* H* L% or H* H+L* L%), while yes-no questions have a rising pattern (L+H* H% or L*+H H%). Additionally, the mean maximum F0 in wh-questions is significantly higher than that in yes-no questions. Speech rate also differs between wh-and yes-no questions, with the former being spoken significantly faster than the latter.

Session 5.2, Paper 4 (14:45-15:00)

Whistled Moroccan Tamazight: Phonetics and phonology*Meyer, Julien; Gautheron, Bernard and Ridouane, Rachid
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This paper reports the results of a pilot phonetic study of whistled Moroccan Tamazight. Whistled speech is an ancient traditional and natural practice that consists in a phonetic emulation and transformation of the spoken signal into a simple melodic line made up of frequency and amplitude modulations of a whistled signal. It is primarily used for long distance communication. We recorded four Moroccan Tamazight speakers in the High Atlas producing this special

speech register. Given its particular characteristics, namely the extensive presence of words and syllables without vowels, the opportunity Tamazight affords for the execution of whistling may be particularly challenging. We show how speakers whistle a selected set of words and sentences and discuss the preliminary results from phonetic and phonological perspectives.

5.3: Consonant and Vowel Duration

Tuesday, August 11, 2015, 14:00-15:00, Carron 1

Chair: Sandra Madureira

Session 5.3, Paper 1 (14:00-14:15)

Durations of voiceless stops in a Sardinian variety

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This paper presents a phonetic study of the duration of voiceless stops in Campidanese, a Sardinian variety spoken primarily in the south of the island. Only a few Sardinian dialects consider the phonological quantity as a feature to distinguish minimal pairs and this emerges only for selected speech sounds, namely nasals and liquids. The pronunciation of Italian by Sardinians usually shows unexpected gemination or degemination of several sounds, thus determining a dialectal feature of many areas of Sardinia, including Campidano and the city of Cagliari. The study allows the acknowledgement of a general degree of control by speakers of this area in the duration of these sounds in consonant clusters but reveals a duration boost for singletons surrounding stressed vowels. Voiceless stops do not show length as a distinctive feature but present a significant lengthening which could be triggered by prosodic conditions.

Session 5.3, Paper 2 (14:15-14:30)

Duration and pitch in the vowel quantity distinction of Yakut: Evidence from spontaneous speech

Vasilyeva, Lena; Arnhold, Anja and Järvikivi, Juhani

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This paper investigates instrumentally for the first time the binary vowel quantity opposition (short vs. long) in Yakut (or Sakha) on the basis of spontaneous production data from nine speakers. Acoustic measurements of vowels in disyllabic words showed a significantly shorter duration of short vowels than their long counterparts. Furthermore, f0 maxima and f0 slope showed effects of both quantity and syllable number. The results suggest that pitch is an additional phonetic correlate of vowel quantity in Yakut, alongside with the robust durational difference between short and long vowels.

Session 5.3, Paper 3 (14:30-14:45)

Duration- vs. style-dependent vowel variation: A multi-parametric investigation

Audibert, Nicolas; Fougeron, Cécile; Gendrot, Cédric and Adda-Decker, Martine

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This study examines phonetic variation in the acoustic properties of the French /i,e,a,o,u/ sub-system as a function of vowel duration and speech style in order to better under-

stand the interplay between these two well-known factors of vowel reduction. Over 1000k vowels extracted from three large corpora of continuous French including read speech (BREF), partly scripted journalistic speech (ESTER) and casual conversations (NCCFr) were split into duration classes (short, medium, long). Six metrics based on F1 & F2 frequencies were used to capture variation in multiple dimensions. Style and duration show comparable effects in terms of reduction in the acoustic working space (overall and in F1 or F2 dimensions), centralization of vowel categories and variability within vowel categories. However, interesting differences are found in terms of overlap between vowel categories: more neutralization of vowel contrasts independent from vowel duration is found in casual conversational speech.

Session 5.3, Paper 4 (14:45-15:00)

Contextual effects on the duration of ejective fricatives in Upper Necaxa Totonac

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The present paper investigates the effects of word position, stress and vowel phonation on the duration of ejective fricatives in Upper Necaxa Totonac (UNT), a Totonacan language of northern Puebla, Mexico. Duration measurements were taken of frication and periods of silence occurring between frication and following vowels. Fricatives occurring in word initial position were found to be overall longer than those occurring intervocally. Fricatives occurring at the onset of stressed syllables were generally longer than unstressed. Lateral ejective fricatives had longer frication durations in intervocalic position preceding a creaky vowel than when preceding a modal vowel. Closures that occurred between frication and vowel onset were found to be longer when the fricative occurred word initially and in stressed syllables.

5.4: Speech Comprehension

Tuesday, August 11, 2015, 14:00-15:00, Dochart 1

Chair: Bill Barry

Session 5.4, Paper 1 (14:00-14:15)

Semantic processing of spoken words under cognitive load in older listeners

Schmidt, Juliane; Scharenborg, Odette and Janse, Esther

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Processing of semantic information in language comprehension has been suggested to be modulated by attentional resources. Consequently, cognitive load would be expected to reduce semantic priming, but studies have yielded inconsistent results. This study investigated whether cognitive load affects semantic activation in speech processing in older adults, and whether this is modulated by individual differences in cognitive and hearing abilities. Older adults participated in an auditory continuous lexical decision task in a low-load and high-load condition. The group analysis showed only a marginally significant reduction of semantic priming in the high-load condition compared to the low-load condition. The individual differences analysis showed that

semantic priming was significantly reduced under increased load in participants with poorer attention-switching control. Hence, a resource-demanding secondary task may affect the integration of spoken words into a coherent semantic representation for listeners with poorer attentional skills.

Session 5.4, Paper 2 (14:15-14:30)

Exemplar effects arise in a lexical decision task, but only under adverse listening conditions

*Nijveld, Annika; ten Bosch, Louis and Ernestus, Mirjam
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This paper studies the influence of adverse listening conditions on exemplar effects in priming experiments that do not instruct participants to use their episodic memories. We conducted two lexical decision experiments, in which a prime and a target represented the same word type and could be spoken by the same or a different speaker. In Experiment 1, participants listened to clear speech, and showed no exemplar effects: they recognised repetitions by the same speaker as quickly as different speaker repetitions. In Experiment 2, the stimuli contained noise, and exemplar effects did arise. Importantly, Experiment 1 elicited longer average RTs than Experiment 2, a result that contradicts the time-course hypothesis, according to which exemplars only play a role when processing is slow. Instead, our findings support the hypothesis that exemplar effects arise under adverse listening conditions, when participants are stimulated to use their episodic memories in addition to their mental lexicons.

Session 5.4, Paper 3 (14:30-14:45)

DIANA, an end-to-end computational model of human word comprehension

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This paper presents DIANA, a new computational model of human speech processing. It is the first model that simulates the complete processing chain from the on-line processing of an acoustic signal to the execution of a response, including reaction times. Moreover it assumes minimal modularity. DIANA consists of three components. The activation component computes a probabilistic match between the input acoustic signal and representations in DIANA's lexicon, resulting in a list of word hypotheses changing over time as the input unfolds. The decision component operates on this list and selects a word as soon as sufficient evidence is available. Finally, the execution component accounts for the time to execute a behavioral action. We show that DIANA well simulates the average participant in a word recognition experiment.

Session 5.4, Paper 4 (14:45-15:00)

How hard can it be to ignore the pan in panda? Effort of lexical competition as measured in pupil dilation

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When speech comprehension becomes effortful, e.g. in adverse conditions, it is necessary to understand which processes are the sources of the effort. By means of pupillometry, this paper investigates whether the automatic process of lexical competition increases effort, and whether mis-

matching cues, degradation of the signal, and listener' experience with degraded signals additionally affect the effort, as reflected by increased pupil dilation. Listeners' pupil dilation was measured during the disambiguation of embedded words when presented with cues that either served or hampered disambiguation. Furthermore, listeners were presented with natural or degraded speech. The effect of experience was measured by testing also long-term users of cochlear implants. Lexical competition increased the effort of processing natural speech and even more so for stimuli with mismatching cues. Mere listening to degraded speech increased the effort more than lexical competition. Experience with degraded speech reduced the effort stemming from listening to un-natural speech.

5.5: Non-Native Speech: Production and Perception

Tuesday, August 11, 2015, 14:00-15:00, Dochart 2

Chair: Paola Escudero Neyra

Session 5.5, Paper 1 (14:00-14:15)

Does allophonic knowledge of L1 contribute to the correct discrimination of non-native sounds?

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The present paper investigated the perception of four Punjabi liquids /r̩ l̩ l̩/ and two stops /d q/ by Japanese listeners. It has been reported that Japanese listeners have difficulty in perceiving the two-way liquid contrast of English because Japanese has only one liquid phoneme. Japanese /r/ has, in fact, a rich allophonic inventory. However, no detailed perception studies have been conducted to test whether rich allophonic inventory of Japanese /r/ helps Japanese listeners to perceive the phonemic four-way liquid and two-way stop contrasts of Punjabi. Our results from the forty-eight Japanese listeners suggested that, regardless of rich allophonic inventory of /r/, the liquid-liquid contrasts are still hard to discriminate for the Japanese listeners, but liquid-stop contrasts are easy to discriminate. On the other hand, retroflex stop [d̪], an allophone of Japanese /r/, has given some advantage in the discrimination of /d-d̪/ contrast and some disadvantage in liquid-stop contrasts.

Session 5.5, Paper 2 (14:15-14:30)

Gradient effects of reading ability on native and non-native talker identification

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Talker identification is heightened for native compared to non-native talkers, suggesting that language comprehension influences talker recognition. Research has revealed a gradient effect of language experience on talker recognition; adults with reading disability show poor talker identification even in their native language. We examined whether this gradient would be observed among adults without reading disability. Monolingual English adults were assigned to the high or low reading group based on standardized as-

sessments. All learned to identify the voices of English and French talkers and were then tested for retention of learning. The results indicate that compared to the low reading group, the high reading group (1) showed increased talker identification during training for both the native and non-native voices and (2) showed increased retention of learning, but only for the non-native voices. These results extend gradient effects of language proficiency on talker identification to include within-normal differences in reading ability.

Session 5.5, Paper 3 (14:30-14:45)

Passive distributional learning of non-native vowel contrasts does not work for all listeners

*Terry, Josephine; Ong, Jia Hoong and Escudero, Paola
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Distributional learning studies investigating the acquisition of the Dutch contrast /ɑ/-/a:/ by nonnative Dutch learners have reported mixed results. The present study extends the literature by examining whether (i) naïve listeners are able to extract the distribution structure of a sequence of /ɑ//a:/ tokens drawn from a continuum; and (ii) differential effects exist between naturalistic vs. exaggerated distributions. Australian-English listeners were randomly assigned to a flat, unimodal, bimodal or enhanced distribution training condition. Their performance was assessed using a categorisation task before and after training. Our findings showed that while categorisation accuracy was higher at post-test vs. pre-test (perhaps due to task learning), naïve learners did not show the predicted distributional learning effects: the bimodal and enhanced groups did not outperform the flat and unimodal groups. The results could be attributed to individual differences in the ability to sustain attention throughout the training phase, which may be necessary for highly variable speech sounds such as vowels.

Session 5.5, Paper 4 (14:45-15:00)

Language attitudes and listener-oriented properties in non-native speech

*Dmitrieva, Olga; Law, Wai Ling; Lin, Mengxi; Wang, Yuanyuan; Conklin, Jenna and Kentner, Ashley
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The study examines a number of acoustic properties of non-native speech directed to a native speaker, a non-native speaker with a shared first language background, and a non-native speaker with a different first language. Results demonstrate that the interlocutor condition interacts with the language attitudes factor: Participants with more positive attitudes towards their second language (English) differ along several acoustic dimensions from participants with more positive attitudes towards their first language (Mandarin), especially when interacting with native speakers of English. Expanded vowel space, higher articulation rate, and increased pitch adopted by English-oriented participants in interactions with native speakers of English may be indicative of their greater positive emotional involvement in the interaction.

5.6: Multimodal Phonetics

Tuesday, August 11, 2015, 14:00-15:00, Boisdale 2

Chair: Björn Granström

Session 5.6, Paper 1 (14:00-14:15)

Acoustic and articulatory correlates of speaking condition in blind and sighted speakers

*Ménard, Lucie; Trudeau-Fiset, Pamela; Côté, Dominique and Turgeon, Christine
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Compared to conversational speech, clear speech is produced with longer vowel duration, greater intensity, increased contrasts between vowel categories, and decreased dispersion within vowel categories. Those acoustic correlates are produced by larger movements of the orofacial articulators, including visible (lips) and invisible (tongue) articulators. How are those cues produced by visually impaired speakers, who never had access to vision? In this paper, we investigate the acoustic and articulatory correlates of vowels in clear versus conversational speech, and in sighted and congenitally blind speakers. Participants were recorded using electroarticulography (EMA) while producing multiple repetitions of vowels in both speaking conditions. Lip movements were larger when going from conversational to clear speech in sighted speakers only. On the other hand, tongue movements were affected to a larger extent in blind speakers compared to their sighted peers. These findings confirm that vision plays a crucial role in the maintenance of speech intelligibility.

Session 5.6, Paper 2 (14:15-14:30)

iPA Phonetics: Multimodal iOS application for phonetics instruction and practice

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iPA Phonetics is an iOS application based on the Laryngeal Articulator Model that illustrates voice qualities, vowel qualities, and consonant production with video/audio of articulations in the oral vocal tract and laryngoscopic video/audio and ultrasound images of the laryngeal vocal tract. The Consonant Chart is an expanded version of the 2005 IPA chart; the replay speed of consonant and vowel sounds can be controlled; and random consonants and vowels can be generated for recognition practice. This self-contained app for Apple iOS mobile electronic devices gives users the ability to access and compare phonetic symbols and sounds together with detailed articulatory production correlates. The app is free on the Apple Store, intended to introduce the general public as well as specialized users of IPA symbolization, via iPad/iPhone technology, to the auditory inventory of possible speech sounds of the languages of the world and to how each sound is physically articulated.

Session 5.6, Paper 3 (14:30-14:45)

A kinematic analysis of prosodic structure in speech and manual gestures

*Krivokapic, Jelena; Tiede, Mark and Tyrone, Martha E.
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Two experiments examining the effects of prosodic structure on the kinematic properties of speech and manual gestures are presented. Experiment 1 investigated the effects of prosodic boundaries, stress and their interaction on manual, oral, and intonation gestures (their duration and coordination). Experiment 2 investigated the effects of different types of prominence (deaccented, narrow focus, broad focus, contrastive focus) on oral constriction, intonation and manual gestures (duration and coordination). We recorded speech audio, vocal tract gestures (using electromagnetic articulometry) and manual movements (using motion capture). To the best of our knowledge, this is the first study to examine kinematic properties of body movement and vocal tract gestures concurrently. Preliminary results focus on the effects of prosodic structure on gesture duration and show that 1) manual and oral gestures are longer phrase-initially than phrasemedially and 2) manual and oral gestures lengthen under phrase-level prominence. [Supported by NIH].

Session 5.6, Paper 4 (14:45-15:00)

Aero-tactile influence on speech perception of voicing continua

*Goldenberg, Dolly; Tiede, Mark and Whalen, Douglas H.
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Previous work [9, 7] has established that puffs of air applied to the skin and timed with listening tasks bias the perception of voicing by naive listeners. The current study has replicated and extended these findings by testing air puff effects on gradations of a voicing continuum rather than the voiced and voiceless exemplars of the original work. This design has the advantage of distinguishing responses differentially along the continuum, and our results show that while overall coincident air puffs bias listener judgments towards increased voiceless responses, the effects are least at the continuum endpoints. This suggests that during integration auditory and aerotactile inputs are weighted differently by the perceptual system, with the latter exerting greater influence in cases where the auditory cues to voicing are ambiguous.

5.7: Patterns of Word Stress

Tuesday, August 11, 2015, 14:00-15:00, Carron 2

Chair: Matthew Gordon

Session 5.7, Paper 1 (14:00-14:15)

Word-onsets and stress patterns: Speech errors in a tongue-twister experiment

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Consonants in word onsets are more often than other consonants involved in interactional speech errors [8] [9]. This has been explained from the process of speech preparation [9] or from the higher degree of activation of initial versus other consonants [2], or from phonotactic constraints on speech errors [6]. Here we report a tongue-twister experiment showing (a) that words in each other's immediate context produce more interactional errors if the words share their stress patterns than if they do not, (b) a considerable

and highly significant word-onset effect that cannot be explained from phonotactic constraints on speech errors. The latter effect is explained as a frequency effect.

Session 5.7, Paper 2 (14:15-14:30)

Fataluku word-level prosody

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This paper examines word-level prosody in Fataluku, an underdocumented Papuan language of East Timor. Although information about Fataluku remains very limited, at least three alternative analyses of word-level prosody have been suggested: predictable accent, phonemic accent and phonemic tone. This study investigates the phonetic facts of the f0 contour in Fataluku, comparing the behaviour of f0 with the claims implicit in each phonological analysis. No evidence was found for any of these three accounts; rather, the evidence in this variety of Fataluku indicates an intonation-only system based on the accentual phrase (AP). Each AP contains one or more words which form a close syntactic or semantic unit and carries a high intonational tone (H) on the syllable containing the second mora.

Session 5.7, Paper 3 (14:30-14:45)

Word stress in Tashlhiyt - Post lexical prominence in disguise?

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This paper reports on a study of lexical and postlexical prominence asymmetries in Tashlhiyt Tamazight (Berber), a language that is renowned for its typologically rare prosodic structures. Carrier phrases were designed to elicit the presence or absence of a postlexical tone on the target word. Contrary to previous reports on the language, measures of acoustic durations and intensity reveal no consistent prominence asymmetries at the level of the word. However, we found evidence for a prominence lending function of tonal events at the postlexical level. We conclude that Tashlhiyt does not show any acoustic evidence for lexical stress and that postlexical events do not appear to be related to lexically determined metrical structures

Session 5.7, Paper 4 (14:45-15:00)

Prosodic patterns and phonetic realization of Kanakanavu lexical stress on disyllabic words

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To the best of our knowledge, this is by far the first phonetic study on Kanakanavu, an endangered Austronesian language spoken in southern Taiwan. A disyllabic word pair only differs in stress position was recorded from four native speakers. Tone type and corresponding acoustic correlates were analyzed. Results showed that lexical stress is realized with ample prosodic patterns when it is on penultimate position, and differences of these patterns were reflected on the corresponding acoustic correlates: Duration of stressed and unstressed vowels did not serve as the major cue. The stressed vowel was even shorter when the word bears stress on the penultimate syllable. In terms of F0, peak alignment pattern conformed to the previous findings on other languages in that temporal coordination for L+H* was demar-

cated later than H*. However, the maximal pitch values of H* and L+H* did not differ much from each other. Further research will be done based on these findings.

ORAL SESSION 6

6.1: Obstruents around the World

Tuesday, August 11, 2015, 16:45-17:45, Boisdale 1

Chair: Zac Boyd

Session 6.1, Paper 1 (16:45-17:00)

An EPG and EMA study of apicals in stressed and unstressed position in Arrernte

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We present EPG (electropalatography) and EMA (electromagnetic articulometry) data from two female speakers of Arrernte, a language of Central Australia. We focus on the apical consonants /t/ and /t̪/, both of which have previously been shown to have a higher spectral centre of gravity for the stop burst when preceding a stressed syllable. Articulatory results suggest that the tongue is most retracted for the retroflex in the weak (i.e. unstressed) context, but that both apicals have a more advanced tongue position in strong (i.e. stressed) positions. In general, there is more variability in tongue-palate contact patterns for the alveolar /t/ than for the retroflex /t̪/. In addition, jaw position is highest for /t/ in stressed position, and lowest for /t̪/ in unstressed position. We suggest that the most prototypical retroflex is the one found in the weak prosodic position.

Session 6.1, Paper 2 (17:00-17:15)

Phonetic reduction of clicks – Evidence from Nlúu

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Based on spontaneous speech data of the Tuu language Nlúu, we used the cross-linguistically established domain-initial strengthening concept in order to examine if and in which way clicks are subject to speech reduction (lenition) in relation to a reference sample of plosives. Results of combined acoustic and auditory analyses suggest that clicks can be reduced in a gradual fashion and show more reduction phrase-finally than phrase-initially, just like plosives. However, unlike plosives, it seems that the reduction of clicks does not primarily affect the complex articulatory process itself, but rather its effort and coordination with phonation.

Session 6.1, Paper 3 (17:15-17:30)

Acoustic properties of the dental vs. alveolar contrast in Mapudungun

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In this paper we undertake an acoustic analysis of dental and alveolar segments in Mapudungun, an indigenous language of Chile. We calculate locus equations for dental and alveolar segment pairs of different manners. We find that dentals differ from alveolars of the corresponding manner in lowering the onset F2 of following vowels. We validate these results by means of a linear mixed model analysis.

Session 6.1, Paper 4 (17:30-17:45)

Dene stop contrasts: Data from Délı̨nę Slavey

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This paper presents the results of an acoustic study of stop contrasts in Délı̨nę Slavey, a Dene (Athabaskan) language with a three-way laryngeal contrast. Stops in 8 speakers were measured. In addition to durational differences between the stops, burst intensity was found to be important for distinguishing aspirated stops from plain and ejective stops, and coarticulatory effects on the following vowel were found to be important for distinguishing ejective stops. Délı̨nę Slavey has stop contrasts similar to those of a number of other Dene languages. The languages varied the most in their realization of ejective stops, but there were consistent patterns: ejectives were never longer than aspirated stops or shorter than plain stops and they were always, among the stops, followed by vowels with the most creaky voice and the slowest intensity rise.

6.2: Focus on Focus

Tuesday, August 11, 2015, 16:45-17:45, Carron 1

Chair: Amalia Arvaniti

Session 6.2, Paper 1 (16:45-17:00)

Computational modelling of double focus in American English

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This study investigated how double focus in English statements and questions can be computationally modelled. PENTATrainer2 was used to learn syllable-sized multi-functional targets from a corpus of 1960 English utterances, with controlled variations in lexical stress, focus, modality, and sentence length. The results showed that the learned targets could generate F0 contours close to the original. In particular, the asymmetry in the interaction between focus and modality was effectively simulated.

Session 6.2, Paper 2 (17:00-17:15)

Narrow focus realization in the monosyllabic lexical pitch contrast in East Norwegian

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The lexical accents of one dialect of East Norwegian were examined using a parametric intonation model. The purpose of this investigation was to examine the tonal contrast using a different method, whereby analyses can be done automatically and additional acoustic cues examined. The disyllabic

contrast of the Trøndersk dialect had been previously described using F0-measurements in Praat, but the current investigation uses a parametric intonation model, PalIntE [21]. The results support the description of accent 1 and accent 2 having a HL contour, with accent 2 having a later alignment with the segmental string. Moreover, accent 2 was found to have a higher maximum and a smaller amplitude of the fall following the peak. The accents did not differ with respect to their rise or the steepness of the rise or fall. This research demonstrates how different approaches to linguistic analyses can inform one another.

Session 6.2, Paper 3 (17:15-17:30)

Phonetic effects of corrective focus in Estonian

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The aim of this study was to investigate whether narrow corrective focus causes stronger intonational emphasis than narrow new information focus. This research question was tested for Estonian, a free word order language where an object noun phrase at the beginning of the sentence (e.g. OVS word order) is claimed to be in structural focus position. We predicted greater pitch prominence for sentence-initial objects in focus. The acoustic parameters of pitch prominence measured in this study – peak height, slope, peak alignment – did not vary as a function of different focus types and word orders. The results therefore support semantic models (e.g. [19]) by which corrective and new information focus do not differ in terms of acoustic prominence.

Session 6.2, Paper 4 (17:30-17:45)

Pitch accent variability in focus production and perception in Bulgarian declaratives

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We investigated variability of pitch accents when it marks different focus types in the speech of young Bulgarians from Sofia. In the production experiment, we found interspeaker variability in the choice of pitch accents, and (!)H* as the predominant nuclear pitch accent in Broad Focus, which is different from the H+(!)H* or H+L* attested in earlier studies. We also found variable alignment of the trailing H tone of pre-nuclear pitch accent L*+H, as well as a new rising tone (LH*) used by some speakers in narrow focus. Perception experiments suggest that LH* is not functionally distinct from L+H*, and that H* and LH* are not consistently distinguished in marking narrow focus.

6.3: Ultrasound Methodology

Tuesday, August 11, 2015, 16:45-17:45, Dochart 1

Chair: Janet Beck

Session 6.3, Paper 1 (16:45-17:00)

Non-metallic ultrasound probe holder for co-collection and co-registration with EMA

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Co-collection and co-registration of ultrasound images of

the tongue and articulometry data requires the stabilization of the ultrasound probe relative to the head using a non-metallic system. Audio, ultrasound, and articulometry data were recorded from 11 North American English speakers reading 10 blocks of 25 sentences, speaking for 2 minutes at a time, spanning a recording time of 45 minutes. The 95% confidence interval for ultrasound probe roll relative to head motion was 1.35°, and 2.12 mm for lateral displacement, such that ultrasound probe displacement is within acceptable rotational and translational parameters as described in the HOCUS paper [9]. The proper use of this probe holder could also allow for adequate ultrasound probe stabilization without external marker tracking for post-processing correction, making this probe holder suitable for field research.

Session 6.3, Paper 2 (17:00-17:15)

Velocity measures in ultrasound data. Gestural timing of post-vocalic /l/ in English

Strycharczuk, Patrycja and Scobbie, James M.

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We propose a new method for extracting dynamic information from midsagittal ultrasound images of tongue shape and location. The method is based on analysing parts of the tongue contour as they appear to travel up and down fan lines at key articulatory locations, representing velar and alveolar constrictions. The tongue displacement in these dimensions serves as the basis for calculating instantaneous velocity, whose maxima and minima help to define articulatory events. We validate the proposed method using data on /l/-darkening in Standard Southern British English. Our analysis extracts systematic information about the relative timing of gestures involved in the articulation of post-vocalic /l/, and it provides the basis for selecting representative images of consonantal constriction.

Session 6.3, Paper 3 (17:15-17:30)

Development of a 3D tongue motion visualization platform based on ultrasound image sequences

Xu, Kele; Yang, Yin; Jaumard-Hakoun, Aurore; Leboulenger, C.; Dreyfus, Gérard; Roussel-Ragot, Pierre; Stone, Maureen and Denby, Bruce

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This article describes the development of a platform designed to visualize the 3D motion of the tongue using ultrasound image sequences. An overview of the system design is given and promising results are presented. Compared to the analysis of motion in 2D image sequences, such a system can provide additional visual information and a quantitative description of the tongue's 3D motion. The platform can be useful in a variety of fields, such as speech production, articulation training, etc.

Session 6.3, Paper 4 (17:30-17:45)

Towards a 3D Tongue model for parameterising ultrasound data

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This paper describes the process and aims of the manual construction of a 3D mesh modelling the tongue, hyoid and mandible. The mesh building process includes the ability to assign muscles to mesh struts which can be independently

contracted to nominal lengths in order to test how the mesh deforms. In this way the behaviour of the mesh can be easily and quickly observed and structures can be amended or enhanced. One such mesh is described which is based on a laminar structure and where the genioglossus is divided into five functionally independent compartments. The model is capable of being deformed to fit midsagittal MRI data of a wide range of distinct articulations by a single speaker and by carefully identifying landmark features and orientation, can also be fitted to ultrasound images for that same speaker.

6.4: L2 Prosody

Tuesday, August 11, 2015, 16:45-17:45, Carron 2

Chair: Jane Setter

Session 6.4, Paper 1 (16:45-17:00)

Comparison of pitch profiles of German and French speakers speaking French and German

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This study examines the pitch profiles of French learners of German and German learners of French, both in their native language (L1), and in their respective foreign language (L2). Results of the analysis of 84 speakers suggest that for short read sentences, French and German speakers do not show pitch range differences in their native production. Furthermore, analyses of mean f0 and pitch range indicate that range is not necessarily reduced in L2 productions. These results are different from results reported in prior research. Possible reasons for these differences are discussed.

Session 6.4, Paper 2 (17:00-17:15)

How natural is Chinese L2 English prosody?

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Standard varieties of Chinese and English have major typological prosodic differences, which present considerable difficulties for Chinese L2 learners of English at all levels: first, differences in the phonotactic foundations of prosody (syllable and syllable sequence patterns); second, the difference between lexical tone language and lexical stress-accent language; third, timing differences in the prosodic hierarchy, including the timing of grammatical units. We compare Chinese L2 and English native speakers in respect of temporal distribution patterns at the phonetics-phonology interface. The SPPAS and TGA phonetic analysis tools are used. Results indicate clear relations between timing patterns at different L2 proficiency levels and native patterns.

Session 6.4, Paper 3 (17:15-17:30)

Developmental stages and variability in the acquisition of second language segments and prosody

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The perceived impression that a spoken utterance is not native is due to the culmination of a combination of segmental

and suprasegmental phonological and phonetic characteristics entrenched in the speakers native language (L1) or it results from different types of interplay between those characteristics of the L1 and the second (or foreign) language (L2). The present paper reports findings of a detailed phonetic analysis of German L2 utterances produced by native speakers of English of different proficiency levels. The results show that the mastery of segments and prosody is not a progression of one and the other but rather that the mastery of individual characteristics of either level follows a structured sequence as predicted under the assumption of language learning as a self-organising dynamic process. The results are best interpreted in adaptation of the framework of the Dynamic Systems Theory (DST).

Session 6.4, Paper 4 (17:30-17:45)

First and second language similarity can hurt the learning of second-language speech segmentation: The case of prosody

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This study investigates whether learning to use prosodic cues to word boundaries in second-language speech segmentation is easier or more difficult if the native and second languages have similar (though non-identical) prosodies than if they have markedly different prosodies. It compares French, Korean, and English listeners' use of fundamental-frequency rise and lengthening as cues to word-final boundaries in French. Fundamental-frequency rise and lengthening signal word-final boundaries in French and Korean but can signal word-initial boundaries in English. Proficiency-matched Korean-speaking and English-speaking second-language learners of French and native French listeners completed a 'visual-world' eye-tracking task where fundamental-frequency rise and/or lengthening signaled the final boundary of target words. Results show that the French and English groups used both fundamental-frequency rise and lengthening to locate word-final boundaries in French, whereas the Korean group used only lengthening. We attribute Korean listeners' non-use of fundamental-frequency rise in French to first-and second-language perceptual assimilation.

6.5: Perceptual Learning

Tuesday, August 11, 2015, 16:45-17:45, Dochart 2

Chair: Sarah Hawkins

Session 6.5, Paper 1 (16:45-17:00)

Perceptual learning in speech is phonetic, not phonological: Evidence from final consonant devoicing

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Listeners flexibly recalibrate the perceptual categorization of sounds in response to speakers' unusual pronunciation variants. Recent studies have shown that generalization of this recalibration can inform us about the nature of prelexical units used for speech perception. The present study

tested whether this generalization is sensitive to phonetic or phonological properties of speech. Using the example of German word-finally devoiced stops, we found that generalization does not extend to sounds that match in phonological specification (here: voiced) when they are dissimilar in their acoustics (phonetically voiceless in word-final position to phonetically voiced word-medially). However, phonologically voiceless stops in word-final and word-medial position did show the effect. This supports suggestions that listeners extract segments of sufficient acoustic similarity from the input and use them for generalization of learning in speech perception. The units of perception thereby appear context-sensitive rather than abstract phonemes or phonological/articulatory features.

Session 6.5, Paper 2 (17:00-17:15)

Patterns of generalization of perceptual learning on phonetic representations

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Recent studies on perceptual learning have indicated that listeners use intermediate units between the acoustic input and lexical representations of words. The same paradigm may also reveal the nature of these intermediate units based on patterns of generalization of learning. We here test whether learning generalizes to other units of the same underlying or surface representation. This was achieved by exposing listeners to tensified Korean stops (i.e., underlying plain stops produced as tense due to a phonological process) and testing the consequences for later presented underlying tense or plain stops. Our results show that learning generalizes to underlying tense stops, while generalization to underlying plain stops could not be found. This indicates that the difference in the underlying phonological representation as tense or plain do not hinder learning as long as there is phonetic similarity on the surface.

Session 6.5, Paper 3 (17:15-17:30)

The effect of non-nativeness and background noise on lexical retuning

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Previous research revealed remarkable flexibility of native and non-native listeners' perceptual system, i.e., native and non-native phonetic category boundaries can be quickly recalibrated in the face of ambiguous input. The present study investigates the limitations of the flexibility of the non-native perceptual system. In two lexically-guided perceptual learning experiments, Dutch listeners were exposed to a short story in English, where either all /l/ or all /ɹ/ sounds were replaced by an ambiguous [l/ɹ] sound. In the first experiment, the story was presented in a clean condition, while in the second experiment, intermittent noise was added to the story, although never on the critical words. Lexically-guided perceptual learning was only observed in the clean condition. It is argued that the introduction of intermittent noise reduced the reliability of the evidence of hearing a particular word, which in turn blocked retuning of the phonetic categories.

Session 6.5, Paper 4 (17:30-17:45)

Attention, word position, and perceptual learning

McAuliffe, Michael and Babel, Molly

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This paper presents the results of an experiment which tested the roles of directed attention and lexical bias on perceptual learning. Attention was manipulated by directing a group of listeners to be aware the speaker had an ambiguous pronunciation of /s/. Lexical bias was manifested by where in the word the ambiguous /s/ was positioned – the first or final syllable. In all conditions listeners were exposed to an ambiguous sound halfway between an /s/ and a /ʃ/ in word contexts for /s/. Listeners who were only exposed to the ambiguous sound in final syllable adapted their category boundary more than listeners who were exposed to the ambiguous sound at the beginnings of words, but only when they were not explicitly instructed to pay attention to the speaker's ambiguous /s/ sounds. These results indicate that perceptual adaptation is at least a partially controlled adjustment.

6.6: Topics in Speech Acoustics

Tuesday, August 11, 2015, 16:45-17:45, Alsh

Chair: James Kirby

Session 6.6, Paper 1 (16:45-17:00)

Automated voicing analysis in Praat: Statistically equivalent to manual segmentation

*Eager, Christopher
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The "fraction of locally unvoiced frames" measure in Praat's Voice Report (VR) is an automated method of obtaining the percentage of a segment which is voiced, but its accuracy has been called into question due to values that change based on scrolling and zooming in Praat's viewing window and don't always match manual voicing segmentation. This study offers statistical support for the accuracy of VR when certain guidelines are followed: (1) use the object window; (2) decrease the time step to increase temporal resolution; and (3) use gender-specific pitch ranges. The closure and frication portions of 277 affricates were analyzed using VR in this way and the results were compared to manual voicing segmentation using paired Wilcoxon tests. The results show that there is no significant difference between VR and manual segmentation, regardless of whether only the closure portion, only the frication portion, or the entire affricate is considered.

Session 6.6, Paper 2 (17:00-17:15)

Effects of lexical frequency and lexical category on the duration of Vietnamese syllables

*Brunelle, Marc; Chow, Daryl and Nguyen, Thuy Nha Uyen
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Our study looks at the effect of lexical frequency, lexical categories and phrase boundaries on syllable duration in Vietnamese. We use durational data to shed light on the status of some ambiguous lexical categories such as kinship terms and positional nouns, and to gather additional evidence on the behaviour of some verbs that have grammaticalized homophones. Our results show that high frequency

words tend to be shorter, that function words are independently shorter than lexical words, and that Vietnamese has pre-boundary lengthening. They also suggest that, in terms of duration, positional nouns pattern with lexical words, and that pronouns derived from kinship terms and grammaticalized verbs are not durationally distinct from their non-grammaticalized counterparts.

Session 6.6, Paper 3 (17:15-17:30)

Beyond North American English: modelling vowel inherent spectral change in British English and Dutch

Williams, Daniel; van Leussen, Jan-Willem and Escudero, Paola

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Theories and methods modelling vowel quality in terms of vowel inherent spectral change (VISC) have been developed and tested overwhelmingly on North American English (AE) dialects, which raises the question of their generalisability in non-AE dialects and other languages. The present paper examines VISC as an aspect of vowel quality in Standard Southern British English (SSBE) and Northern Standard Dutch (NSD). Despite markedly different VISC patterns, SSBE vowels are analysable along the same lines as in AE. While the same mostly holds for NSD, VISC is found to be more important for determining SSBE vowel quality, especially for SSBE nominal diphthongs. Additionally, a pair of NSD diphthongs presents a challenge for current theories and methods as they are acoustically similar. In line with studies on AE, theorising vowel quality in terms of VISC aids descriptions of vowels and removes the need to treat nominal monophthongs and diphthongs in different ways.

Session 6.6, Paper 4 (17:30-17:45)

Analysis of voice register transition focused on the relationship between pitch and formant frequency

Uezu, Yasufumi and Kaburagi, Tokihiko

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When the voice register transition (VRT) occurs, vocal-folds motion becomes unstable and the voice pitch jumps abruptly. In this article, we examine the relationship between the fundamental frequency f0 and the first-formant frequency F1 in VRT to reveal the influence of the source-filter interaction (SFI) on VRT. Five Japanese male speakers produced rising glissandos with vowels /a/ and /i/. The vibratory state of the vocal folds and the vocal tract resonances were measured simultaneously with an electroglottograph device and an external acoustic excitation method. We analyzed the temporal change in f0 from electroglottograph signals and in F1 using acoustic response signals. The relationship between f0 and F1 were then analyzed to determine the cause of VRT and abrupt f0 jump. As a result, f0 was very close to F1 when VRT arose in /i/, indicating the influence of SFI as a cause of VRT.

6.7: Prosody and Speech Production

Tuesday, August 11, 2015, 16:45-17:45, Boisdale 2

Chair: Eva Liina Asu

Session 6.7, Paper 1 (16:45-17:00)

Effects of phrasal position and metrical structure on alignment patterns of nuclear pitch accents in German: Acoustics and articulation

Niemann, Henrik and Mücke, Doris

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In this production study, we investigate the effects of phrasal position and metrical structure on alignment patterns of nuclear rising pitch accents in German. In the acoustic domain, peak alignment varies across open and closed syllables. In the articulatory domain, these effects of metrical structure disappear. The peak shows a stable coordination pattern with the vocalic target of the accented syllable. However, effects of phrasal position occurred in both domains leading to a leftward shift of the peak towards the accented vowel. We conclude that alignment is best understood as coordinative structures between tones and oral constriction gestures instead of co-occurrence of nearby-landmarks on the acoustic surface.

Session 6.7, Paper 2 (17:00-17:15)

Dissecting the consonant duration ratio

Sotiropoulou, Stavroula; Pillmeier, Erika; Katsika, Argyro and Gafos, Adamantios I.

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It has been argued that the duration ratio (DR) of two consonants in C1C2 serves as a diagnostic of syllabification: if greater than 1, then C1C2 is a syllable onset; if (approximately) 1, C1C2 is a coda-onset sequence. If valid, this diagnostic would provide a straightforward way of assessing syllabic organization. We examined the validity of the DR using the Wisconsin X-Ray Microbeam corpus, which due to its size permits a robust test. We also informed our evaluation by another archive of kinematics and acoustics, with finer comparisons. These corpora extend an evaluation of the DR to word-medial clusters, in addition to initial and crossword contexts wherein the DR has been studied before. Our results indicate that duration ratio patterns previously thought to be related to syllabification derive from levels of representation or prosody which are not specifically syllabic. These patterns are conditioned by prosodic effects and manner contrasts.

Session 6.7, Paper 3 (17:15-17:30)

Phonetic detail and the role of exposure in dialect imitation

D'Imperio, Mariapaola and German, James Sneed

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Speakers are able to adjust their prosodic patterns to approximate those of a different dialect, at least when the dialects involved are phonologically similar [6, 7]. Our study explores imitation across two dialects of English (Singaporean and American) whose prosodic systems are phonologically very distinct. Singaporean speakers were recorded both in their native dialect and while attempting to imitate sentences produced by an American English speaker. Our results show that in spite of the structural differences, speakers of Singapore English are able to rapidly adapt and shift from an edgebased system to an accentual system within the time of the experiment, as well as to finely tune the phonetic detail of their intonation patterns in a way that closely tracked that of the American English model speaker.

We further show that the degree of variability in successfully reproducing the target values is dependent on amount of exposure to the non-native dialect.

Session 6.7, Paper 4 (17:30-17:45)

What is special about prosodic strengthening in Korean: Evidence in lingual movement in V#V and V#CV

Shin, Seulgi; Kim, Sahyang and Cho, Taehong

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The present study investigates the effects of Boundary and Prominence (focus) on the /a/-to-/i/ tongue movement in Korean in two contexts: V#V and V#/m/V. Results show that the tongue movement at an IP boundary is larger, longer, and faster. Prominence effects show a relatively weaker but comparable pattern to the boundary effect, showing a larger, longer, and faster movement. The observed boundary-induced strengthening pattern in Korean is clearly different from that in English, implying that Korean, a language without constraints from the lexical stress system, has more freedom to strengthen articulation at prosodic junctures, creating strengthening patterns which are often encountered with prominence marking in English. Results also reveal that the presence of a consonant influences transboundary vocalic movement, and that the consonantal influence is further modulated by boundary strength. These results taken together are further discussed in terms of language-specificity of prosodic strengthening and its implications for the pi-gesture model.

and postalveolar affricates in two Rhaeto-Romance varieties, namely i) Jauer, a Romansh dialect spoken in the Canton of Grisons (Switzerland), and ii) Maréo, a Ladin dialect spoken in the province of Bolzano (Italy). An acoustic analysis is carried out on the realizations of ten speakers of each variety, using the spectral mean or 'Center of Gravity' in order to verify the degree of difference between the two places of articulation. The results show an almost complete merger of the two categories in Jauer, whereas Maréo offers a more differentiated picture according to the age factor, given that older speakers appear to be more conservative.

Paper P1.3 (Presenter at poster: 09:45-11:30)

On misperception in rhoticisation and lambdacisation

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Misperception is one of the sources of sound change. This study investigates to what extent misperception can account for rhoticisation of laterals and lambdacisation of rhotics. To this end, laterals and rhotics varying across different acoustic dimensions are embedded in logatomic word forms and presented to native listeners of Greek in a forced choice task. While lateral rhoticisation could be predicted as a function of lateral duration, with shorter laterals undergoing more perceptual confusion with rhotics than longer laterals – especially in intervocalic position – the lateral's degree of darkness had no effect on participants' responses. Rhotic lambdacisation was high for rhotic approximants; taps and trills, however, were overwhelmingly correctly perceived as rhotics. An additional rhotic variant, a tap lacking the characteristic svarabhakti vocoid, yielded high rates of perceptual elision. The results of the experiment are discussed with respect to documented sound changes.

Paper P1.4 (Presenter at poster: 09:45-11:30)

A hybrid model to investigate language change

Duran, Daniel; Bruni, Jagoda; Walsh, Michael and Dogil, Grzegorz

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In this paper we propose a hybrid multi-agent modelling framework which facilitates investigation into sound change by combining the sociophonetic model of Nettle [14] and the exemplar-based model of Wedel [21] into a single unified model. The framework facilitates simulation scenarios of different social networks with varying interaction schemes and social distances between the agents. Additionally, the structure of an individual agent's mental lexicon is embedded in an exemplar-theoretic setting. The goal of this modelling framework is to enable examination of competition between different phonetic forms. Though in no way limited to this particular example, we illustrate our new hybrid framework with the case of competition between phonetically intuitive /mb/ and unintuitive [mp] voicing variants of post-nasal stops in Tswana.

Paper P1.5 (Presenter at poster: 09:45-11:30)

Cross-dialectal differences in nasal coarticulation in American English

Tamminga, Meredith and Zellou, Georgia

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We use acoustic measurements from spontaneous corpora

POSTER SESSION 1

Phonetics of Sound Change

Tuesday, August 11, 2015, 09:45-11:30

Paper P1.1 (Presenter at poster: 09:45-11:30)

Reconstructing the sounds of words from the past

Coleman, John; Aston, John and Pigole, Davide

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We are developing novel statistical and signal processing methods to work backwards from contemporary audio recordings of simple words in modern Indo-European languages to regenerate audible spoken forms from earlier points in the language family tree. In this paper we present our first tentative steps in developing some of the necessary technical methods for realising this ambition, especially audio reconstruction of sound changes relating spoken Latin to French, Italian, Spanish and Portuguese.

Paper P1.2 (Presenter at poster: 09:45-11:30)

Palatal obstruents in two Rhaeto-Romance varieties: Acoustic analysis of a sound change in progress

Schmid, Stephan; Negrinelli, Stefano and Lorenzo, Filipponio
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This study provides a comparative analysis of palatal stops

data to compare the social conditioning of nasal coarticulation across two American English dialects: Mid-Atlantic (Philadelphia Neighborhood Corpus) and Midlands (Buckeye Corpus). Each dialect is represented by 40 speakers stratified by age and sex. An acoustic measure of nasal coarticulation is calculated using the within-speaker by-vowel difference between A1-P0 in pre-nasal contexts (ban) and A1-P0 in non-nasal contexts (bad), with measurements taken automatically at 6 equidistant points throughout the vowel. The overall amount of nasal coarticulation is found to be larger in Philadelphia than in Columbus. However, in Philadelphia, the young speakers produce less nasal coarticulation than the older speakers, with older men producing the greatest nasal coarticulation. In Columbus, the young women set themselves apart from the other groups by using very little nasal coarticulation. We suggest that both dialects are reducing their degree of nasal coarticulation, which we argue is a socially-motivated change.

Paper P1.6 (Presenter at poster: 09:45-11:30)

Loss of prevoicing in modern Japanese /g, d, b/

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In several dialects of Japanese, including the Tokyo-area dialects that are the basis for the standard variety, there is an apparent change in progress that affects the pronunciation of word-initial /g, d, b/. Although young speakers today often produce these stops with short-lag voice onset time (VOT), the distribution of VOT values measured in productions by several generations of speakers in a database that was recorded ten years ago suggests a phonetically gradual shift from very heavily voiced variants (with extra-long lead VOT) to less heavily voiced variants, rather than a phonologically gradual diffusion of a discrete change to "devoiced" values. The extremely long VOT values in the productions of the oldest speakers in the database are in keeping with philological evidence suggesting that the starting point for the change was a series of prenasalized stops. The suggestion is evaluated against the cross-generational corpus using two phonetic measures that might index the degree of nasal venting of oral air pressure during the closure of a prevoiced stop.

Paper P1.7 (Presenter at poster: 09:45-11:30)

Phonetic convergence of Mandarin L2 English speakers towards Australian English

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Speech convergence provides a good model on studying L2 accent change in a short-term conversation. The present study investigates Mandarin L2 English speakers accommodating towards an Australian speaker before and after a task-based conversation. Acoustic analysis and a perceptual AXB test on the vowels /e:/, /æ/ and /o:/ were carried out to measure the convergence effect before and after the task. Both acoustic measurements and perceptual analysis showed that the Chinese participants only accommodated to Australian /e:/, but not to /æ/ and /o:/. Results suggested that non-native English speakers were able to accommodate to native accent even only after 1 hour of exposure. How-

ever, the convergence did not occur on the vowel which has the larger acoustic-phonetic distance between learners' L1 and L2. Perception predicted by PAM could not fully explain the production change.

Phonetic Psycholinguistics and Neurolinguistics I

Tuesday, August 11, 2015, 09:45-11:30

Paper P1.8 (Presenter at poster: 09:45-11:30)

Patterns of individual differences in reduction: Implications for listener-oriented theories

Turnbull, Rory

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Many listener-oriented theories of phonetic reduction assume that the talker has tacit knowledge of an interlocutor's mental state, and consequently predict that talkers with poor theory of mind should exhibit inconsistent behavior between semantic contexts. This study examined effects of individual differences in theory of mind skills on the extent of phonetic reduction in three acoustic domains (word duration, vowel duration, and vowel dispersion) in contexts of high and low semantic predictability. Overall, a trend was observed whereby participants with stronger theory of mind skills produced less phonetic reduction than participants with poorer theory of mind skills. These results are not consistent with the predictions of listener-oriented theories, or indeed other contemporary theories. We conclude that individual differences ought to be considered in more detail by phonetic theory.

Paper P1.9 (Presenter at poster: 09:45-11:30)

Assessing the link between speech perception and production through individual differences

Franken, Matthias K.; McQueen, James M.; Hagoort, Peter and Acheson, Daniel J.

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This study aims to test a prediction of recent theoretical frameworks in speech motor control: if speech production targets are specified in auditory terms, people with better auditory acuity should have more precise speech targets. To investigate this, we had participants perform speech perception and production tasks in a counterbalanced order. To assess speech perception acuity, we used an adaptive speech discrimination task. To assess variability in speech production, participants performed a pseudo-word reading task; formant values were measured for each recording. We predicted that speech production variability would correlate inversely with discrimination performance. The results suggest that people do vary in their production and perceptual abilities, and that better discriminators have more distinctive vowel production targets, confirming our prediction. This study highlights the importance of individual differences in the study of speech motor control, and sheds light on speech production-perception interaction.

Paper P1.10 (Presenter at poster: 09:45-11:30)

Perception and representation of Bengali nasal vowels

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The paper addresses the question of native speakers' online awareness and perceptual use of phonetic nasalisation by examining surface nasalisation in two types of surface vowels in Bengali: underlying nasal vowels and nasalised vowels before a nasal consonant. In a cross-modal forced-choice experiment, we investigate the hypothesis that only unpredictable nasalisation is represented and that this sparse representation governs listeners' interpretation of vowel nasality. Auditory primes consisting of CV segments of monosyllabic CVC words containing either nasal vowels ([cã] for cãd), oral vowels ([ca] for cal) or nasalised oral vowels ([ca(n)] for can) preceded visual full-word targets. Faster reaction times and fewer errors are observed after nasal vowel primes compared to both oral and nasalised vowel primes. This indicates that nasal vowels are specified for nasality and lead to faster recognition compared to the oral vowel conditions, which are underspecified and thus cannot be perfectly matched with incoming signals.

Paper P1.11 (Presenter at poster: 09:45-11:30)
Non-native memory traces can be further strengthened by short term phonetic training

*Tamminen, Henna and Peltola, Maija S.
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Learners of a second language go through many proficiency levels during language learning. University language students can be considered advanced learners, who behaviourally perceive the language at least nearly similarly as native speakers. It can also be assumed that memory traces for the second language phonemes have developed for these learners and their MMN responses for foreign contrasts may be even native-like. Here, we wanted to find out whether these students have memory traces for second language speech categories. Further, we investigated whether their behavioural perception can be improved and can the memory traces be strengthened by training. For this purpose we tested Finnish university students of English on a three-day listen-and-repeat training procedure. The baseline MMN response was further strengthened and the category boundary became more consistent, reaction times decreased and discrimination sensitivity increased. The perception – behavioural and psychophysical – of the learners of English was further strengthened by listen-and-repeat training.

Paper P1.12 (Presenter at poster: 09:45-11:30)
Does a change in talker identity help listeners resolve lexical competition? Evidence from phonological priming.

*Dufour, Sophie; Dumon, Amélie and Nguyen, Noël
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In this study, we examined whether the lexical competition process embraced by most of models of spoken word recognition is sensitive to talker variation. We used a long lag priming experiment in which primes and targets sharing all except the last phoneme (e.g. /bagar/ "fight" vs /bagaz/ "luggage") were presented in two separate blocks of stimuli. Our results showed clear inhibitory priming effects with slower response times when target words were preceded

by a phonologically related prime in comparison to a control prime. However, we also observed that the magnitude of the inhibitory priming effect was of the same magnitude whether the prime competitor and the target word were spoken by different talkers or by the same talker. The results are discussed in reference to other studies showing talker specificity-effects and in which access to talker-specific representations was demonstrated.

Paper P1.13 (Presenter at poster: 09:45-11:30)

Primary and secondary cues to voice assimilation in French and Slovenian

*Hallé, Pierre; Segui, Juan and Androjna, Kaja
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Several important issues in voice assimilation have been recently revisited. In particular, is it gradient or categorical? Distributional analyses of the voicing ratio in assimilating vs. neutral contexts conducted on French data have yielded somewhat discrepant results, yet suggesting that assimilation is categorical and optional at the same time. In this study, we compare between-word voice assimilation data reported for French with similar data collected for Slovenian: Is assimilation stronger in one language and how categorical is it in each language? We also compare voice assimilation in the two languages for secondary cues to voicing, such as closure duration, and compare the assimilation produced for words vs. nonwords. We find that voice assimilation is more categorical and occurs more often in Slovenian than French, that some secondary cues to voicing resist assimilation in French but not in Slovenian, and that assimilation is similar for words and nonwords in both languages.

Paper P1.14 (Presenter at poster: 09:45-11:30)

How does information status affect sentence planning: An eye-tracking study

*Chen, Yiya and Ganushchak, Lesya
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This study investigates online sentence formulation as a function of the information structure of an utterance. In an eye-tracking experiment, participants described pictures of transitive events. Information status of the message was manipulated in the discourse preceding each picture. In the Literal condition, the subject character was literally mentioned. In the Associative condition, the subject character was primed without literal mention. In the No Mention condition, the subject character was neither literally mentioned nor primed. The response was expected to be the same in all conditions. Results showed that participants looked first at the subject character and then the object character regardless of the condition. The time course of the gaze patterns, however, did differ across the three conditions, which reflects the availability of the to-be-encoded information as a function of the preceding discourse context.

Paper P1.15 (Presenter at poster: 09:45-11:30)

Perceptuo-motor interactions across and within phonemic categories

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Past studies have demonstrated that reaction times in producing CV syllables are modulated by audio distractors par-

ticipants hear while preparing their responses. Galantucci et al. [5] showed that participants respond faster on trials with identical response-distractor pairs than when the response and distractor differ in voicing or articulator. The dynamical model of phonological planning developed in [9] attributes these differences in reaction times to phonological parameters of a distractor exciting or inhibiting the planning of a response. A so far untested prediction of the model is that within-category phonetic variation in the voicing parameter of the distractors still gives rise to congruency effects of the articulator. We report new results which show effects of response-distractor articulator congruency for distractors with varying voice onset times. These results extend previous findings by pursuing predictions concerning within-category variability of distractor stimuli.

Paper P1.16 (Presenter at poster: 09:45-11:30)
Individual differences in working memory capacity and their effect on speech processing

*Gilbert, Annie C.; Boucher, Victor J. and Jemel, Boutheina
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Though tests of working memory (WM) correlate with scales of language development, it is unclear how WM capacity relates to spoken-language processing. However, Gilbert et al. (2014) have shown that listeners perceptually chunk speech in temporal groups (TGs) and that the span of these TGs influences memory of heard items. Assuming that WM capacity links to this processing of speech in groups, listeners with the highest WM spans would be better at recalling items from long TGs. To examine this, we presented two sets of stimuli (utterances and sequences of meaningless syllables) containing long TGs. After each stimulus, listeners had to determine if a target item was previously heard. An analysis using GLME models showed that correct recognition memory of items heard in utterances was significantly better for listeners with high WM spans than for listeners with smaller spans. The effect was marginally significant for sequences of nonsense syllables.

Speech Acoustics I: Acoustics of Consonants
Tuesday, August 11, 2015, 09:45-11:30

Paper P1.17 (Presenter at poster: 09:45-11:30)
Word-initial voiceless stop geminates in Kelantan Malay: Acoustic evidence from amplitude/F0 ratios
*Hamzah, Mohd Hilmi; Fletcher, Janet and Hajek, John
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The present study explores non-durational correlates of the word-initial voiceless stop singleton/geminate contrast in Kelantan Malay (KM) by focusing on the relative values of amplitude and F0 across two syllables of disyllabic words. We are particularly interested in identifying any inter-syllabic differences that could potentially enhance the acoustic salience of voiceless stop geminates in utterance-initial position, given the lack of acoustic closure duration in this specific context. Results indicate that relative amplitude and relative F0 across syllables do contribute to the differentiation of word-initial voiceless stop singletons and

geminates in KM, with amplitude and F0 ratios being usually significantly higher in the geminate context. The effect is further enhanced for utterance-initial tokens and it is also consistent across places of articulation. The conclusion is drawn that the word-initial voiceless stop length contrast in KM can also be characterized by differing amplitude/F0 ratios alongside the well-known primary acoustic correlate of closure duration.

Paper P1.18 (Presenter at poster: 09:45-11:30)
British English [kw], [k], and [w] distinction in back rounded vowel contexts

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Corpus data from the Audio British National Corpus was used to compare the acoustics of British English stops with velar and/or labial articulation in onset positions preceding back rounded vowels. The acoustics of labialized velar stops in British English have not commonly been described due to their frequent phonological analysis as clusters. Labialized velars have been characterized cross-linguistically in terms of low second formant frequency, but it was found that third formant frequency is a more significant cue to differentiation in back rounded vowel contexts. Plain velars with non-phonemic labialization resulting from proximity to a following back rounded vowel did not differ significantly from labialized velars in formant transition frequencies. Lower F3 in labial-velar approximants indicates more lip-rounding, but higher F2 suggests a more fronted tongue position. Locus equations show that rounded vowels following [kw] are less affected by coarticulatory rounding than following [w].

Paper P1.19 (Presenter at poster: 09:45-11:30)
Spectral tilt as an acoustic correlate to pharyngealisation in Jordanian and Moroccan Arabic

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The aim of this study is to evaluate the role of spectral tilt, alongside the traditionally looked at frequencies of the first two formants, in describing the acoustic characteristics of pharyngealisation in Jordanian and Moroccan Arabic. Twenty male speakers (10 per dialect) produced vowels in each dialect preceded by /d dˤ/. Normalised spectral tilt results show an overall lowered values for voice quality correlates, e.g., *H1-*H2, *H1-*A1, *H1-*A2, *H1-*A3, and [-ATR] correlate *A1-*A2, and overall raised values for *A1-*A3 and *A2-*A3 in the pharyngealised context. Results for the former group suggest a tense voice caused by the larynx being raised [24, 26, 28, 35], whereas in the latter suggest a higher energy component close to the F2-F3 region [16]. High classification rates were obtained and showed that spectral tilt was able to distinguish pharyngealised vs non-pharyngealised well, advocating its importance as an acoustic cue for pharyngealisation in Arabic.

Paper P1.20 (Presenter at poster: 09:45-11:30)
Voicing and devoicing in Irish English voiced plosives

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This study investigates the extent of voicing in the voiced plosives /b, d/ across a range of phonetic contexts in Irish

English. Spectrographic and waveform analysis showed that /b, d/ were almost always voiceless sentence-initially, substantially devoiced sentence-finally, and varied considerably sentence-medially. Further analysis of sentence-medial position found that if the plosive was part of a stressed syllable it was substantially less voiced than if it was part of an unstressed syllable. Focus also had an effect: less voicing was found in a nuclear syllable in narrow focus than in broad focus or a deaccented tail. Comparison of these findings with an analogous study [6] of two other varieties of English (Wisconsin and North Carolina) did not verify the hypothesis that Irish English has a greater tendency to devoice medial /b/. Instead, there was a large inter-speaker difference, with two speakers showing devoicing of /b/ frequently and two speakers infrequently.

Paper P1.21 (Presenter at poster: 09:45-11:30)

Evaluation of segmentation approaches and constriction degree correlates for spirant approximant consonants

Figueroa, Mauricio and Evans, Bronwen G.

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The segmentation of Spanish spirant approximant consonants poses several methodological challenges given the gradual transition from these consonants to neighbouring segments. Most studies to date employ manual segmentation approaches, although these methods are highly subjective and time-consuming. Alternative automated approaches have used the minimum intensity in the consonant and maxima from the surrounding segments as landmarks for relative intensity measurements. Multinomial Logistic Regression (MLR) analyses were used to assess whether acoustic measurements obtained from manual and automated segmentation approaches are able to predict the level of a known categorical outcome variable (phoneme category). A third analysis was included to explore the predictive capabilities of data from several constriction degree correlates, based on relative intensity or spectral energy measurements. Results showed a slight advantage for the automated segmentation method. As for constriction degree correlates, some measurements – Intensity Ratio and Intensity Difference A – were unable to fully predict the categorical variable outcome.

Paper P1.22 (Presenter at poster: 09:45-11:30)

An investigation of intervocalic affricate simplification in Mandarin

Jones, Taylor and Cui, Aletheia

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We investigate the reduction of the palatal affricate /tʂ/ both word-initially and word-medially in spoken Mandarin, using the CALLHOME corpus of informal telephone conversations. An overwhelming majority of the tokens shows reduction in both environments. The processes of reduction include voicing, deletion of obstruent acoustic cues, glide formation, and complete deletion of the segment. We found that word-initial tokens of /tʂ/ have a higher retention rate of affricate acoustic cues, and word-medial tokens have a higher rate of lenition to a glide. While word-initial /tʂ/ tokens always exhibit some consonantal feature, a number of word-medial tokens show complete deletion of /tʂ/. Additionally, the re-

alizations of reduction were highly gradient. There were no immediately apparent regional patterns. There was no suggestion of change in apparent time or age grading effects.

Paper P1.23 (Presenter at poster: 09:45-11:30)

Acoustics of Spanish and English coronal stops

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This study explores the acoustic correlates that distinguish coronal stops (/t/, /d/) between English and Spanish. English and Spanish coronal stops are hypothesized to differ in terms of voice-onset time and place of articulation. We are particularly concerned with capturing the place of articulation difference with acoustic data, as the voice-onset time difference is well known. Specifically, we focus on English /d/ and Spanish /t/, which are phonetically-voiceless stops with a short-lag voice-onset time. Spanish /t/ has been described as being articulated at a dental place, whereas English /d/ is articulated at an alveolar place. Mixed-effects models explored various spectral measurements of the consonant burst and found that standard deviation, relative burst intensity, and center of gravity differed as a function of place of articulation (or language).

Speech Perception I: Variability, Learning and Adaptation

Tuesday, August 11, 2015, 09:45-11:30

Paper P1.24 (Presenter at poster: 09:45-11:30)

Adult age effects in auditory statistical learning

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Statistical learning plays a key role in language processing, e.g., for speech segmentation. Older adults have been reported to show less statistical learning on the basis of visual input than younger adults. Given age-related changes in perception and cognition, we investigated whether statistical learning is also impaired in the auditory modality in older compared to younger adults and whether individual learning ability is associated with measures of perceptual (i.e. hearing sensitivity) and cognitive functioning in both age groups. Thirty younger and thirty older adults performed an auditory artificial-grammar-learning task to assess their statistical learning ability. In younger adults, perceptual effort came at the cost of processing resources required for learning. Inhibitory control (as indexed by Stroop color-naming performance) did not predict auditory learning. Overall, younger and older adults showed the same amount of auditory learning, indicating that statistical learning ability is preserved over the adult life span.

Paper P1.25 (Presenter at poster: 09:45-11:30)

Greater benefit for familiar talkers under cognitive load

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Earlier work has demonstrated that cognitive resources are expended when processing the speech of an unfamiliar talker. As such, processing the speech of a familiar talker

is a more efficient, automated process. Similarly, data have shown that separating a speech signal from noise also uses cognitive resources, and listeners with larger working memory capacities are better able to perceive speech in noise. Given the inverse relationship between perceiving familiar speech and perceiving speech in noise, and presuming that these processes tapped the same cognitive store, we tested the hypothesis that listeners would show a greater talker familiarity benefit when perceiving speech in noise while under cognitive load than when perceiving speech in noise with no load. Our hypothesis was confirmed. We discuss our results in terms of their implications for listeners for whom everyday listening is challenging.

Paper P1.26 (Presenter at poster: 09:45-11:30)
Measuring speech-in-noise intelligibility for spontaneous speech: The effect of native and non-native accents

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Previous research has found that listeners understand talkers who speak with the same accent as themselves better than others. The aim of the current study was to investigate how speech intelligibility is modulated by this talker-listener accent interaction when native and non-native listeners hear spontaneous speech. To this end, native Southern British English listeners and native Korean listeners were tested on the recognition of read and spontaneous speech spoken with a native English accent (Standard Southern British English) and non-native English accents (Finnish and Korean-accented English). The results demonstrated that native listeners have an intelligibility benefit for their own accent over non-native accents when they listen to spontaneous speech as well as read speech. However, native Korean listeners had a trend for them to have higher intelligibility for Korean-accented speech only in the spontaneous speech condition.

Paper P1.27 (Presenter at poster: 09:45-11:30)
Effects of speaker variability on processing spoken word form and meaning in short-term priming

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Processing of spoken word form and meaning is separately evaluated from short-term repetition and semantic/associative priming experiments to investigate the role of speaker variability in spoken word recognition. The assumption that lexical representation and processing only involve abstract component devoid of stimulus variability is evaluated. The results from the repetition priming experiment show a robust attenuation of phonological form priming by speaker variability. However, the same effect is absent from the semantic priming experiment. These results suggest that the effect of speaker variability on processing spoken language may depend on the depth or level of processing. The time course for speaker variability cannot be confirmed from these two experiments. Different patterns arise from lexical decision and voice discrimination tasks, suggesting the influence of attention factors on speaker variability effect.

Paper P1.28 (Presenter at poster: 09:45-11:30)

The perception of foreign-accented speech by cochlear implant users

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The current study investigated the perception of foreign-accented speech by prelingually deaf, long-term cochlear implant (CI) users. CI and normal-hearing (NH) listeners made judgements about the intelligibility of short sentences produced by native and non-native speakers of American English. While both CI and NH listeners rated foreign-accented sentences as less intelligible than native sentences, the CI listeners perceived smaller differences in intelligibility between foreign-accented and native sentences. However, the CI listeners demonstrated substantial individual variability in their ratings. Additional analyses of these individual differences showed that CI listeners who were more sensitive to foreign accent differences also had better speech perception abilities. Taken together, these results suggest that CI listeners are sensitive to foreign accents, but less so than NH listeners. Further, their sensitivity to this source of variability in the speech signal may reflect the development and use of basic speech and language processing skills.

Paper P1.29 (Presenter at poster: 09:45-11:30)
Distributional vowel training may not be effective for Dutch adults

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Distributional vowel training for adults has been reported as "effective" for Spanish and Bulgarian learners of Dutch vowels, in studies using a behavioural task. A recent study did not yield a similar clear learning effect for Dutch learners of the English vowel contrast /æ/~/ɛ/, as measured with event-related potentials (ERPs). The present study aimed to examine the possibility that the latter result was related to the method. As in the ERP study, we tested whether distributional training improved Dutch adult learners' perception of English /æ/~/ɛ/. However, we measured behaviour instead of ERPs, in a design identical to that used in the previous studies with Spanish learners. The results do not support an effect of distributional training and thus "replicate" the ERP study. We conclude that it remains unclear whether distributional vowel training is effective for Dutch adults.

Paper P1.30 (Presenter at poster: 09:45-11:30)
Variability in noise-masked consonant identification

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Speech communication commonly occurs in the presence of noise. Perceptual errors in the perception of noise-masked speech vary as a function of noise type (e.g., white noise, speech-shaped noise, multi-talker babble), listener characteristics (e.g., listeners with hearing loss, non-native listeners), and target stimulus properties (e.g., native language of the talker, casual vs clear speech). There is evidence of talker-specific effects in multitalker- babble-masked sentence intelligibility as well as token-specific effects in speech-shaped-noise-masked CV syllables. The present work analyzes talker- and token-level variation in the identification of a large number of tokens of four consonant categories - [t], [d], [s], [z] - produced by 20 talkers

and masked by multi-talker babble. A fitted multilevel logistic regression model illustrates variation in intelligibility between talkers and with respect to within-talker (between-token) variation. The results are discussed in relation to landmark theory and the glimpsing model of speech-in-noise perception.

Paper P1.31 (Presenter at poster: 09:45-11:30)
Changes in consonant perception driven by adaptation of vowel production to altered auditory feedback
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Adaptation to altered auditory feedback has been shown to induce subsequent shifts in perception. However, it is uncertain whether these perceptual changes may generalize to other speech sounds. In this experiment, we tested whether exposing the production of a vowel to altered auditory feedback affects perceptual categorization of a consonant distinction. In two sessions, participants produced CVC words containing the vowel /i/, while intermittently categorizing stimuli drawn from a continuum between "see" and "she." In the first session feedback was unaltered, while in the second session the formants of the vowel were shifted 20% towards /u/. Adaptation to the altered vowel was found to reduce the proportion of perceived /ʃ/ stimuli. We suggest that this reflects an alteration to the sensorimotor mapping that is shared between vowels and consonants.

Phonetics of Second and Foreign Language Acquisition I: Perception

Tuesday, August 11, 2015, 09:45-11:30

Paper P1.32 (Presenter at poster: 09:45-11:30)
Perceptual assimilation and identification of English consonants by native speakers of Danish
Horslund, Camilla Søballe; Ellegaard, Anne Aarhøj and Bohn, Ocke-Schwen
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This study explored the relation between the identification of non-native consonants and the perceptual assimilation of non-native consonants to native categories. In Experiment 1, native Danish listeners identified 20 initial English consonants in terms of Danish categories, and then rated the goodness of fit of these matches. The results of this perceptual assimilation experiment were used to predict how accurately Danish listeners would identify English consonants. The predictions were tested in Experiment 2, in which Danish listeners identified the same 20 initial English consonants using English response categories. Our results indicate that perceptual assimilation patterns of non-native consonants predict identification quite well, but they also suggest that current speech learning models need to account for non-native listeners' occasional but systematic response biases.

Paper P1.33 (Presenter at poster: 09:45-11:30)
Perception of assimilated and non-assimilated coda nasal by Japanese learners of German

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This study investigates the perception of the German coda nasal contrast /n/-/m/-/ŋ/ by Japanese learners of German compared to German native speakers. The phonological distribution of coda nasals differs with/without word boundaries in the two languages. Word final coda before a pause in Japanese is neutralized to /n/ but the place feature remains in German. Assimilation of coda nasals before consonants is obligatory in Japanese but not in German. Two experiments were conducted to test how syllable-final nasals with/without word boundary are perceived by Japanese speakers. The results show that Japanese listeners are sensitive to the duration of the nasal, a perceptual cue to word-final neutralized nasals. Durational manipulation reinforced or weakened Japanese learners' perception, suggesting that nasal assimilation is related to the length of the nasal.

Paper P1.34 (Presenter at poster: 09:45-11:30)
Phonetic similarity predicts ultimate attainment quite well: The case of Danish /i, y, u/ and /d, t/ for native speakers of English and Spanish
Garibaldi, Camila Linn and Bohn, Ocke-Schwen
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This study examined how well phonetic similarity predicted ultimate attainment in the production of Danish /i, y, u/ and /d, t/ by highly experienced native speakers of English and of Spanish. Experiment 1 compared the VOT of /d, t/ and the F2 of /i, y, u/ as produced by native speakers of the three languages. Experiment 2 examined the perceptual assimilation of Danish [i, y, u] to native /i, u/ by native English and native Spanish listeners. Experiment 3 indicated that native English speakers used their native (non-Danish) /t/ and /u/ in Danish, and did not produce Danish /y/ correctly. Native Spanish speakers produced Danish /y/ correctly, and they produced /t/ and many /d/ tokens differently in Spanish and in Danish. These results are interpreted in terms of current speech learning models which claim that phonetic similarity predicts speech learning success at ultimate attainment.

Paper P1.35 (Presenter at poster: 09:45-11:30)
Japanese listeners' identification of English voiceless fricatives in reverberant listening environments
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This research investigated the identification ability of English voiceless fricatives by Japanese listeners with high and low English proficiency. A perceptual experiment was carried out in five listening environments: RT (Reverberation Time) = 0.78 s, 1.12 s, 1.43 s, RT = 0.78 s + background noise at SNR (Signal-to-Noise ratio) = 10 dB, and quiet. Correct identification rates were calculated and influence of the Japanese listeners' English proficiency was considered by means of TOEICC® scores. In addition, confusion matrices were created to investigate the misperception patterns. The results were then compared with those of native English listeners. Results showed that there was a significant difference between English and Japanese listeners, but no significant difference between English listeners and Japanese

listeners with higher English proficiency. However, detailed analyses of misperception patterns revealed differences between the two groups as well as similarities between Japanese with higher and lower English proficiency.

Paper P1.36 (Presenter at poster: 09:45-11:30)
Perception of English syllable-final consonants by Chinese speakers and Japanese speakers.

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This study investigates perception by Mandarin Chinese and Japanese native speakers of English consonants in syllable-final position, and the effect of vowel duration as a cue to voicing in syllable-final stops. Two experiments were conducted in the study and the results revealed that Mandarin Chinese speakers performed better than Japanese speakers but the position of the consonant in the syllable affects the perception rate. Japanese speakers can perceive the voicing in syllable-final consonants better than Mandarin Chinese speakers; also they may make better use of vowel duration as a cue to perceive voicing in syllable-final stops.

Paper P1.37 (Presenter at poster: 09:45-11:30)
F0 influence in the perception of Korean initial stops, affricates and fricatives: A comparison between native speakers and Japanese learners

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This study examines F0 influence on perception of Korean initial lax, aspirated, and tense consonants by Japanese learners of the Korean language. Stimuli consisted of mono-syllabic sounds (/ta, tsa, tha, tsha/) with interchanged F0s, including lax and aspirated consonants. Results from recognition testing of the stimuli found that both beginning and advanced learners paid less attention to stimuli F0 in comparison to native speakers from Seoul. In cases where stimuli included a tense stop (/t'a/), a tense affricate (/ts'a/), and a non-tense1 and a tense fricative (/sa, s'a/), F0 had no significant influence on recognition for the native speakers. In contrast, both the beginners and advanced learners focused on changes in F0, evaluating consonants by the changes. In the acquisition of Korean initial consonants (lax, aspirated, tense), Japanese learners are liable to adopt inaccurate judgment methods of either "insufficient focus on F0" or "excessive focus on F0", with learning experience showing no significant effect on acquisition.

Paper P1.38 (Presenter at poster: 09:45-11:30)
Picking up the cues to a new consonant contrast: Danish learners' production and perception of English word-final /s/ - /z/

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The present study examined how non-native speakers produce and perceive a voicing contrast that does not exist in their native language, and which is importantly signaled by an acoustic cue which has a very different function in the native language. Danish has no fricative voicing contrasts, which in English occur in initial, medial, and final position. An important acoustic cue for the final voicing contrasts in English is the duration of the preceding vowel. In Danish,

vowel duration is used to contrast vowels. In Experiment 1, Danish learners of English produced only a small and non-significant difference in the vowel:fricative ratio, but Experiment 2 revealed that the same learners differentiated the final voicing contrast perceptually, influenced by vowel duration much like the native speakers. The overall results imply that although L2 learners do not produce certain unfamiliar contrasts native-like, they can use L2 cues to differentiate contrasts in perception.

Paper P1.39 (Presenter at poster: 09:45-11:30)
Form priming across dialects: L1 and L2 effects
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Research shows that cross-dialect lexical recognition can be asymmetrical, favouring non-dominant dialect speakers and prejudicing dominant-dialect speakers [10]. We ask if non-dominant dialect speakers exhibit similar perceptual effects when exposed to modified L2 input that aligns with their particular L1 dialect. The dialect feature examined is Spanish coda [-s]-aspiration. Participants were from Bogotá (non-[-s]-aspirating) and Barranquilla ([‐s]aspirating), Colombia. Participants carried out an auditory form-priming task with lexical decision. Critical Spanish trials consisted of word-pairs matched across dialects (basta 'enough' [bahta][bahta]) or unmatched ([bahta]-[basta]). In the English version, critical trials included similar items, modified to reflect the s-aspiration pattern of Barranquilla Spanish ('display' [dihpleri]-[displeri]), also in matched or unmatched pairs. Results show that speakers of [-s]-aspirating dialects were equally fast at recognizing native-dialect targets and nonnative dialect targets. English form-priming results followed a similar pattern, with the modulating effect of English proficiency, as measured by a standardized vocabulary test.

Paper P1.40 (Presenter at poster: 09:45-11:30)
Does perception precede production in the initial stage of French nasal vowel quality acquisition by Japanese learners? A corpus-based discrimination experiment
*Detey, Sylvain and Racine, Isabelle
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This article presents the results of an AXB discrimination task testing the ability of Japanese beginner learners to distinguish three French nasal vowels /ã ã ë/ and compares them with the results of a corpus-based analysis of their production of the same vowels in two tasks (wordlist repetition and wordlist reading). This perception-production study is embedded in an ongoing 2-year longitudinal study in the framework of an international multi-task corpus-based research programme about the phonetic-phonological systems of non-native varieties of French. Our main results indicate first that the /ã/-/ë/ contrast is better perceived than the /ã/-/ã/ contrast and second that /ë/ obtains a lower discrimination rate when it is contrasted with /ã/, whereas no difference is found between /ã/ and /ã/. These findings are discussed in light of the production results and support the principle according to which perception precedes production in the acquisition of a new phonological contrast.

Paper P1.41 (Presenter at poster: 09:45-11:30)
Predicting vowel discrimination accuracy through

cross-linguistic acoustic analyses

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This study compares the acoustic properties of Australian English and Brazilian Portuguese vowels as a means of predicting L2 discrimination difficulty. Euclidean Distances between the vowels of the two languages were computed to quantify acoustic similarity and to predict discrimination difficulty for Australian English learners of Brazilian Portuguese. Results show that Euclidean Distances successfully predict classification patterns in statistical models. We further compared the models' results to those of a previous study reporting Australian English listeners' discrimination of Brazilian Portuguese vowels, showing that real listeners' discrimination difficulty is indeed predicted by the current acoustic analyses.

Paper P1.42 (Presenter at poster: 09:45-11:30)

Effect of experience on Chinese assimilation and identification of English consonants

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Two groups of Chinese listeners with different English experience participated in an English to Chinese consonant assimilation experiment and an English consonant identification experiment. The results show that listeners with high English experience had a more concentrated assimilation pattern than low experience listeners. However, the goodness ratings did not differ much between the two groups. These results support the idea of "rephonologization" raised by the theoretical model PAM-L2. The results also demonstrate that there was significant high correlation between assimilation overlap and confusion for the low experience group but not for the high experience group, indicating the assimilation pattern of the high experience group may not truthfully reflect the perceptual similarity between the two language sounds.

Speech Acoustics I: Acoustics of Vowels

Tuesday, August 11, 2015, 09:45-11:30

Paper P1.43 (Presenter at poster: 09:45-11:30)

Production of vowel contrasts in Northern Standard German and Austrian Standard German

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The inventory of 15 German full vowels realized by speakers of Northern Standard German (NSG) and Austrian Standard German (ASG) is investigated acoustically. The vowels were produced in phono-tactically regular nonsense words (bVp and dVt environments) embedded in a sentence frame. The analyses revealed that the main difference between both varieties can be found in a different acoustic realization of the tense-lax contrast in high (especially front) vowels. With respect to spectral as well as temporal structure ASG lax high vowels are very much closer to their tense counterparts than

in NSG. For the tense-lax differentiation here the greater long/short ratio as well as a higher f0 for lax vowels in ASG are much stronger cues than in NSG.

Paper P1.44 (Presenter at poster: 09:45-11:30)

Quebec French close vowels in lengthening contexts: tense, lax or diphthongised? An acoustic study

*Sigouin, Caroline and Arnaud, Vincent
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Quebec French close vowels /iyu/ are regularly lengthened in syllables closed by the consonants /vzʒ/. The quality of these variants is subject to debate: they are variously described as tense, slightly unstable or diphthongised. It has also been suggested that they would be tense before /vzʒ/, but lax before /v/, with a concomitant diphthongisation. The present study aims to provide an acoustic account of the question. 360 tokens of lengthened close vowels produced by 30 speakers from three cities were analysed and compared to short (tense and lax) variants. The duration was calculated and F0, F1, F2 and F3 were estimated at 25, 50 and 75% of the duration. Our results suggest that the F1 of lengthened variants is intermediate between tense and lax values, and that it decreases during emission. Furthermore, the acoustic characteristics of lengthened vowels vary according to the following consonant and the speaker's geographical origin.

Paper P1.45 (Presenter at poster: 09:45-11:30)

Acoustic analysis of the Syrian Arabic vowel system

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This paper describes the vowel system of Damascus Arabic in Syria, from now onwards referred to as Syrian Arabic (SA). We examine the acoustic correlates of SA short/long vowel contrasts, and investigate the status of mid vowels in SA. The goal is to expand on the auditory description of the SA vowel system performed by Cowell [8]. The full set of vowel categories proposed by Cowell were produced in a neutral /hVd/ context by fifteen SA speakers. Quantitative analysis of vowel duration and formant measurements confirms that the vowel system of Syrian Arabic includes the main /i(:)/, /a(:)/, and /u(:)/ short/long vowel contrasts and supports the phonemic status of mid-long vowels /e:/ and /o:/. However, the phonemic status of the mid short vowels [e] and [o] and of schwa was not supported and they are analysed as allophonic variants of their high counterparts /i/ and /u/, respectively

Paper P1.46 (Presenter at poster: 09:45-11:30)

Articulatory positions of Japanese vowels as a function of duration computed from a large-scale spontaneous speech corpus

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The purpose of this study is to illustrate certain features of the place of articulation of Japanese vowels on the basis of formant frequency. For this purpose, two types of relationship between vowel duration and formant frequency were examined. The first of these relationships was the correlation between speaking rate and formant frequency. The result of this analysis showed that as speaking rate slows, ar-

ticulations get more distinct: open vowels increase in openness, close vowels increase in closeness, front vowels increase in frontness, and back vowels increase in backness. The second relationship was between formant frequencies and vowel length. The result of this analysis showed that place of articulation is more distinct in long vowels than in short vowels. The exception was the back vowel /u/, which did not show greater backness in long vowels. This result supports previous arguments that that Japanese /u/ is not a typical back vowel.

Phonetics of Second and Foreign Language Acquisition I: Learning and Training

Tuesday, August 11, 2015, 09:45-11:30

Paper P1.47 (Presenter at poster: 09:45-11:30)

Auditory feedback methods to improve the pronunciation of stops by German learners of French

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The effect of manipulation of a speaker's voice as well as exposure to a native speaker's utterance was investigated regarding the pronunciation of stops by German learners of French. Three subject groups, a Control (CG), a Manipulation (MG), and a Native Speaker (NG) Group, were recorded on two subsequent days. The MG was presented with a manipulation of their voice on the second day and the NG listened to a native French speaker, while the CG did not receive any feedback. Results show that speakers of the MG and NG were able to extract useful information from the respective feedback and successfully adapted to it. Participants were able to reduce their voice onset time values, although speakers of the NG reduced it to a greater extent.

Paper P1.48 (Presenter at poster: 09:45-11:30)

Learning of a non-native vowel through instructed production training

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Models of second language acquisition predict that adults are unlikely to learn to produce a non-native vowel very quickly due to their reduced sensitivity to acoustic features not phonological in their native language. Earlier studies show that attention focusing training and articulatory instructions can facilitate learning of non-native speech sounds. We used an instructed listen-and-repeat paradigm with young Finnish adults to help them learn a non-native vowel in two days of training. The results indicated that adults learned to produce the vowel after just one session of training, likely as a result of the combination of explicit instructions and training that made them maximally responsive to the new acoustic features.

Paper P1.49 (Presenter at poster: 09:45-11:30)

Non-native production training with an acoustic model and orthographic or transcription cues

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The perception and production of non-native speech sounds is the key to learning a new language. The differences between the native and the target language sound systems cause learning problems, but orthographic conventions may also affect the learning process. We tested whether a misleading orthography in contrast to phonemic transcription affects the manner in which native Finns learn to produce a non-native speech sound embedded in a pseudo word context. After the two day training protocol, the subjects who, in addition to the acoustic stimulation, were exposed to transcription cues, significantly changed their non-native productions according to the target. In contrast, the subjects who trained with the orthographic stimuli, changed their productions away from the acoustic target and towards the visual one. This result suggests that visual information is of crucial importance in learning to modulate articulation according to the target language model.

Paper P1.50 (Presenter at poster: 09:45-11:30)

The effect of high variability phonetic training on the production of English vowels and consonants

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This study evaluated Korean early learners' production of English vowels and consonants before and after high variability phonetic training (HVPT), for the purpose of investigating the effects of perceptual training on speech production. Korean learners aged 11-12 were trained to discriminate multiple sets of English vowel and consonant contrasts, and their pre- and post-training recordings were evaluated by native speakers of English. Although the trainees showed significant improvements for some sounds, the overall results demonstrated that the effect of perceptual learning on speech production is not significant and the improvements in the two domains (i.e. perception and production) are not correlated.

Paper P1.51 (Presenter at poster: 09:45-11:30)

Effects of English /r/-/l/ perceptual training on Japanese children's production

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It has been proven that high-variability English /r/-/l/ perceptual training improves Japanese adults' production. The present study examined whether Japanese children also improve their production for the English /r/-/l/ contrast after perceptual training. The results demonstrated that production was significantly improved, but the improvement did not relate to an improvement in the primary acoustic cue use for the contrast (e.g., lowering F3 for English /r/ and raising F3 for English /l/). This suggests that children may respond to phonetic training differently from adults, and improve their production mostly through the modification of secondary acoustic cues.

Paper P1.52 (Presenter at poster: 09:45-11:30)

A systematic approach to the pronunciation training of phonotactics

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This article describes an extension of the Computer-Assisted Listening and Speaking Tutor (CALST), an online pronunciation training platform. New exercises help L2-learners of Norwegian to overcome repairs caused by the violation of the phonotactic constraints of their native language. The article presents the contrastive analysis implemented for this purpose and discusses the repair strategies used by speakers when they learn a new language. It also discusses the limitations of the approach and the opportunities for learning from the errors which learners make.

Paper P1.53 (Presenter at poster: 09:45-11:30)
The effects of perceptual training on the production of English vowel contrasts by Portuguese learners

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This study investigated the short-and long-term effects of a high variability perceptual training on the production of three English vowel contrasts (/i//ɪ/; /ɛ/-/æ/; /u/-/ʊ/) by Portuguese learners. The perceptual training consisted of five sessions divided into two blocks that included both discrimination and identification tasks followed by immediate feedback with natural stimuli produced by multiple native talkers in different phonetic contexts. Vowel production data were collected three times, namely before training (pretest), immediately after (posttest), and two months later (delayed posttest) with a sentence-reading task. Both duration and the first two vowel formants were measured to calculate the Euclidian distance (Hz) and duration ratios (ms) between the vowels of the target contrasts. The acoustic analyses revealed that perceptual training had a significant effect on pronunciation accuracy of the target vowels, specifically in terms of vowel quality.

Paper P1.54 (Presenter at poster: 09:45-11:30)
L1 drift and L2 category formation in second language learning

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Assimilatory phonetic drift in L1 has been shown to occur in early second language learners when separate L2 categories have not been established. The direction and likelihood of drift is affected by degree of L1:L2 difference [2], and the need to maintain L1 distinctions [10]. We assessed the impact of explicit L2 phonetic training on L1:L2 interaction when novel L2 sounds could lead to a more crowded L1-L2 phonetic space. Native English-speaking college students completed a lesson on Spanish:English stop voicing contrasts midway through their first semester of introductory Spanish. Training led to improved Spanish VOT values, improved L1 and L2 category differentiation for most subjects, and L1 phonetic drift in voiceless and/or voiced stops for individual speakers. Thus, explicit instruction can facilitate L2 category learning even when this produces crowding among L1 and L2 categories. Furthermore, L1 drift is a common but not necessarily inevitable part of the process.

Paper P1.55 (Presenter at poster: 09:45-11:30)
Comparing the perceptual training effects on the per-

ception and production of English high-front and high-back vowel contrasts by Cantonese ESL learners

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This study investigated the effects of High Variability Phonetic Training (HVPT) in training both the perception and production of English high-front vowels /ɪ/-/i:/ and high-back vowels /ʊ/-/u:/ by Cantonese ESL learners. Results showed that the HVPT was generally effective in improving the subjects' perception of the two vowel pairs and perceptual learning could generalize to new words and new speakers and be transferred to the production domain, but more perception and production improvement could be observed in the high-front vowel pair than the high-back one. Acoustic analysis also showed that although the subjects tended to exaggerate the vowel duration, the F1 and F2 values also changed, but more was observed in the high-front vowel pair. This is not consistent with SLM as Cantonese has vowels which are similar with the two target L2 vowel pairs but the extent of learning of both target vowel pairs was different.

POSTER SESSION 2

Speech Production and Articulation I: Articulation of Consonants

Tuesday, August 11, 2015, 15:00-16:45

Paper P2.1 (Presenter at poster: 15:00-16:45)

Articulation of single and geminate consonants and its relation to the duration of the preceding vowel in Japanese

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Japanese is a language that has contrasts between single and geminate consonants. This phonological contrast is claimed to affect the duration of the neighboring vowel so that the preceding vowel is phonetically longer before geminates. The present study examines the difference in articulatory manifestations between single and geminate consonants and their relation to the duration of the preceding vowel using an EMA system. The results showed that the tongue peak during CC occurs later than that during C for all speakers. However, the duration of the preceding vowel showed interpersonal variation. Thus, the later occurrence of peak timing per se does not directly affect the length of the preceding vowel. Other factors that may affect the duration of the preceding vowel are discussed.

Paper P2.2 (Presenter at poster: 15:00-16:45)
Electropalatographic analysis of /p/ and /ɸ/ in Croatian

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Croatian sounds /p/ and /ɸ/ are traditionally classified as

palatal, but the lack of instrumental articulatory data causes uncertainties about their true articulatory characteristics. Since it was recently proposed that two groups of sounds could be identified within the group traditionally labelled as "palatal" in the International Phonetic Alphabet (i.e. alveolopalatal and palatal), it was our aim to investigate articulatory characteristics of /ɲ/ and /ʎ/ and see whether these two sounds have the characteristics of alveolopalatal, palatal or palatalized sounds. For this purpose we used electropalatographic data from six native speakers of Croatian. The results showed that there was no evidence of a purely palatal production of these sounds and that they were predominantly produced as alveolopalatals. The analysis also showed that /ʎ/ was more fronted and more variable than /ɲ/. There were significant inter-speaker differences in all variables.

Paper P2.3 (Presenter at poster: 15:00-16:45)

Epenthetic and excrescent vowels in stop sequences in Tripolitanian Libyan Arabic

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We report on an investigation of inter-consonantal intervals (ICIs) in sequences of two, three and four stops within and across word boundaries in Tripolitanian Libyan Arabic (TLA). This variety of Arabic has been described as allowing vowel epenthesis in all consonant clusters [7]. Our investigation was motivated by the question of whether some of the 'epenthetic vowels' of TLA are better characterized as 'excrescent vowels', following the distinction made by [5]. To answer this question, we analysed ICI durations at normal and fast speaking rates across permissible stop sequences within and across word boundaries. We also investigated the relationship between ICI duration and voicing. Our results are consistent with the observations presented in [7], but show that there is indeed evidence for the existence of both epenthetic and excrescent vowels in TLA.

Paper P2.4 (Presenter at poster: 15:00-16:45)

Effect of voicing on the self-perception of effort in French consonant production

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This study aims to understand if and how French subjects perceive vocal effort in a production task. Vocal effort is engaged through all voiced phonemes. Consonants are particularly interesting because they constrain voice production in many ways. To study vocal effort in these phonemes, which also involve articulatory effort, we first want to assess if it is possible for speakers to perceive vocal effort. Ninety-six normal subjects produced 48 minimal pairs of items with a voicing contrast and indicated the item in each pair that required a greater effort. The results show an effect of voicing on the self-perception of effort in French consonants production with a larger effort produced for voiced consonants (62%) than for voiceless ones. This effect is modulated by the manner (stop > fricative), the placement (posterior > anterior) and the context (less vocalic > more vocalic). These results complete the theory of vocal effort mechanisms.

Paper P2.5 (Presenter at poster: 15:00-16:45)

Articulatory movement in non-native consonant clusters

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We investigated articulatory movements of native Japanese speakers' productions of non-native consonant clusters, using the WAVE system (NDI Corp.). Four Japanese male speakers pronounced "blat", "bnat", "btat", and "pnat" 10 times each in a carrier sentence. Tongue tip displacement from the first to the second consonant varied greatly among the speakers. An ANOVA with two factors, Speaker and Cluster, was performed, and showed significant main effects of both Speakers ($p<0.0001$) and Clusters ($p<0.0001$), and significant interaction ($p<0.0001$). In addition, comparison with previous data of English speakers indicated that the tongue tip displacement in Japanese speakers was larger than that for English speakers. We suggest that the large displacement from the first to second consonant for Japanese speakers indicates that coarticulation is more difficult for them than it is for English speakers.

Paper P2.6 (Presenter at poster: 15:00-16:45)

The articulation of mutated consonants: Palatalization in Scottish Gaelic

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Scottish Gaelic (henceforth SG) exhibits a rich system of consonant mutation, which is mostly governed by its morphology. Using ultrasound imaging, this study explores the articulation of palatalization in SG, considered a type of consonant mutation, asking the question of how various palatalized consonants are produced. The results from 6 SG speakers show that there is a clear gestural difference between plain and palatalized consonants, but yield highly idiosyncratic variations in how speakers distinguish them. The findings from this study provide empirical evidence that the phonemic contrast plain vs. palatalized in SG manifests gesturally, and potentially support speaker-specific variability in speech production.

Paper P2.7 (Presenter at poster: 15:00-16:45)

Comparing palatography patterns of Estonian consonants across time

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The few known palatographic studies on Estonian consonants date back to the 1970s, and no research in articulatory phonetics has been practised throughout the following four decades. Recently, the Estonian EPG corpus was recorded using a contemporary EPG system. In the paper we introduce first results on contemporary palatography patterns of Estonian sonorants and compare these to results from Arvo Eek's seminal studies in the 1970s.

Paper P2.8 (Presenter at poster: 15:00-16:45)

An ultrasound investigation into articulatory variation in American /r/ and /s/

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This ultrasound study investigates articulatory variability in American English /r/ and /s/ production in onset and coda position, and in the context of the vowels /a, i, o/. Variability both between and within participants is examined. Between speakers, our data support the position of Brunner et al.[2] that flatter palates are correlated with less articulatory variability. Within speaker, our data suggests that articulation of either /r/ or /s/ does not predict articulation of the other.

Paper P2.9 (Presenter at poster: 15:00-16:45)

Pharyngealization of East Thuringian postvocalic /r/: Articulation, acoustics and temporal extent

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This study investigates the acoustic and articulatory influence of postvocalic /r/ on the realization of vowels in an East Central German variety. A selection of /r/ and /r/-less word pairs containing the short vowels /YeAOU/ of seven male speakers were recorded using Ultrasound Tongue Imaging (UTI). Systematic differences were found both in lingual configurations as well as spectral measures (F1-F3) consistent with pharyngeal constriction. Especially the articulatory analysis of a greater portion of the word indicates consequences of /r/ having greater temporal extent showing /r/ to be a feature of the entire syllable rather than of a single segment.

Paper P2.10 (Presenter at poster: 15:00-16:45)

Development of /r/ in Croatian

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The aim of this study was to determine age of acquisition of the alveolar trill /r/ in typically developing Croatian children and to describe developmental renditions of the target phoneme – the age of their occurrence and suppression. The study included 600 participants aged between 3 and 7. Speech elicitation was conducted by a picture-naming task in which the target phoneme was represented in initial, medial, final and syllabic position. The results show that the alveolar trill should be developed by the age of six after an intensive period of development at the age of five. Omissions do not occur in the speech of three year olds and are not typical renditions for that age; substitutions should be considered developmental by the age of 4;6 and distortions by the age of 6;0.

Paper P2.11 (Presenter at poster: 15:00-16:45)

A UTI study on the phonetic allophony of Tyrolean /R/

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Moving from traditional dialectological literature and inspired by contemporary research on rhotics, in this paper we present preliminary data on the distribution and the articulation of /r/ in Tyrolean, an under-researched South Bavarian dialect. Two speakers produced a comprehensive selection of Tyrolean words containing /r/. They uttered up to five different uvular rhotics: [χ, ʁ, ʁ̥, ρ, R]. We found mild tendencies in the allophonic distribution of the variants, but systematic differences in their lingual configurations: trills are produced with steep lowering the tongue tip; vocaliza-

tions are markedly lowered and retracted, with the tongue dorsum flat; approximants are retracted.

Tone I: Production and Representation

Tuesday, August 11, 2015, 15:00-16:45

Paper P2.12 (Presenter at poster: 15:00-16:45)

The perception study of Mandarin Tone 1 and Tone 4 by Hong Kong Cantonese speakers: The pitch effects

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Mandarin has four lexical tones and Hong Kong Cantonese has six lexical tones. The pitch pattern of T1 and T4 in Mandarin is high level and high falling. According to the results of previous research, the pitch boundary of T1 and T4 by native speakers of Mandarin is categorical. Using the synthesized disyllable real words as stimuli, this paper aims to examine the identification and discrimination of Mandarin T1 and T4 by 24 native speakers of Hong Kong Cantonese. The finding of this study can provide reference to Cantonese studies and language teaching in Hong Kong.

Paper P2.13 (Presenter at poster: 15:00-16:45)

Phonetic insights into a simple level-tone system: 'Careful' vs. 'impatient' realizations of Naxi high, mid and low tones

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The Naxi language has three level tones: H, M and L (plus a marginal Rising tone). The present study aims to offer phonetic insights into this simple system through examination of production data from three male speakers and one female speaker: realizations of the three level tones on CV syllables, under two reading conditions, labelled as 'CAREFUL' and 'IMPATIENT'. Fundamental frequency (F0), glottal open quotient (Oq), and formant frequency characteristics are estimated. The three level tones span about 8 semitones under 'CAREFUL' reading and 11 semitones under 'IMPATIENT' reading. The average distance separating H from M is on the same order as that separating M from L. Under 'IMPATIENT' reading, F0 register is higher. Oq follows speaker-specific patterns. No clear pattern of influence of tone or reading condition on vowel articulation was found. These findings (along with the original data, made available in full) offer a basis for cross-linguistic comparison.

Paper P2.14 (Presenter at poster: 15:00-16:45)

High tone shift and spreading in endangered Japanese dialects

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This paper analyses H(igh) tone shift and spreading in Koshikijima Japanese, a highly endangered language spoken in the south of Japan. It is a moraic language as opposed to a syllabic one where an H tone is placed on a certain mora by counting the number of moras from the end of the word. However, this moraic principle is often violated if the H tone is assigned by rule to the second, i.e. non-head,

mora of heavy syllables. Based on original fieldwork, this paper demonstrates that the endangered language attempts to avoid the marked prosodic structure in two independent ways: H tone shift and H tone spreading. In a way, these solutions reveal an interesting interaction between (word) tone and the two prosodic units, syllable and mora. The paper also provides principled accounts for several types of phonological asymmetries observed in the tonal phenomena.

Paper P2.15 (Presenter at poster: 15:00-16:45)

Acoustic investigation of neutral tone in Brunei Mandarin

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This study provides an acoustic analysis of the neutral tone in Brunei Mandarin. Recordings were made of a short text by 20 Bruneian (BN) and 20 Beijing Chinese (CN) speakers. F0 contours and duration of three categories of disyllabic words for the BN and CN data were compared. It was found that the BN data tends to have a neutral tone on grammatical morphemes such as le (perfective) and de (possessive) but not on the second syllable of other words that would have a neutral tone in Standard Mandarin such as yīfu ('clothes') or reduplicates such as māma ('mother'). In addition, it was found that the F0 contour shows a clear distinction between BN and CN for the reduplicated kinship term māma ('mother'), but duration is a better indicator of the presence of a neutral tone for the other categories.

Paper P2.16 (Presenter at poster: 15:00-16:45)

Tone features in Qimen Hui Chinese dialect

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This paper examines tone features on the basis of an acoustic phonetic analysis of F0 and duration data from 10 speakers in Qimen Hui Chinese Dialect. The results show that there are 3 level tones, 2 rising tones, and 1 falling tone in Qimen. The fact that speakers use different F0 contours in the realization of different types of level tones sheds light on the understanding of underlying mechanisms of tonal production. Other relevant issues of tonal phonology, such as contour tones, binary usage of features, and tone register, were also discussed.

Paper P2.17 (Presenter at poster: 15:00-16:45)

Gradience in contextual tonal realization processes: An instrumental study of Nanjing Chinese

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This acoustic study has investigated contextual tonal variations in 125 disyllabic words produced by six native speakers of Nanjing Chinese, with five phonemic tones. Three types of tonal variation were observed in the data: neutralizing sandhi, non-neutralizing sandhi and tonal coarticulation. Comparison between the three types of tonal variation suggests that tone sandhi may be rooted in phonetic coarticulation and influenced by the perception-production interaction. Non-neutralizing sandhi processes demonstrate a transition stage from tonal coarticulation to category-changing and neutralizing tone sandhi. The contextual tonal realiza-

tion in Nanjing Chinese exhibits a gradient effect in terms of tonal category change, indicating a blurry boundary between phonetic and phonological processes.

Paper P2.18 (Presenter at poster: 15:00-16:45)

Interaction of pitch and vowel length in two Dene tone languages: Tłı̨chò Yatiì (drg) and Dene Sų́line (chp)

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This study concerns the interaction of pitch, morphology and vowel length in Tłı̨chò Yatiì (Dogrib) and Dene Sų́line (Chipewyan), Dene (Athabaskan) tone languages of the Mackenzie River Drainage. Starting from an earlier study we extend it to investigate the realization of tone on long vowels in Tłı̨chò Yatiì. Our results indicate that slope is a feature of vowel length contrast.

Paper P2.19 (Presenter at poster: 15:00-16:45)

Phonetic transcription of tone in the IPA

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When conducting fieldwork on tone languages, the linguist choosing to use the IPA to make phonetic transcriptions of tone is presented with a challenge: Current methods of tone transcription in the IPA require a degree of phonological analysis before they can be applied and when applied they do not adequately display pitch distinctions relative to other pitches. I describe this challenge and the bar method as a proposed solution. The bar method visually presents F0 distinctions relative to other F0 expressions without ties to segments. I hope this solution facilitates the discussion of phonetic tone transcription without regard to phonological assumptions, linguistic tradition, or geographical area of research.

Paper P2.20 (Presenter at poster: 15:00-16:45)

The effect of word frequency and neighbourhood density on tone merge

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This paper studies the effect of word frequency and neighbourhood density on lexical tone merge in Dalian Mandarin. Monosyllabic words with two lexical falling tones (i.e. Tone1 and Tone 4) are produced by 60 native speakers from two different generations (middle-aged vs. young). The stimuli consist of three conditions: high neighbourhood density with high word frequency (HDHF), high neighbourhood density with low word frequency (HDLF) and low neighbourhood density with high word frequency (LDHF). Syllable duration as well as the F0 curve and F0's velocity profile of tonal contours are quantitatively analysed through linear-mixed modelling and functional data analysis. Results show that Tone 1 and Tone 4 are near-merged in Dalian Mandarin. Word frequency and neighbourhood density show no effect on duration, but do affect the concave and convex of F0 curves and the slope of F0's velocity profile, which suggests their role in the tone merge process.

Paper P2.21 (Presenter at poster: 15:00-16:45)

Effects of speaking rate and context on the production of Mandarin tone

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Acoustic variability is ubiquitous in speech. To understand how listeners cope with this variability, the present study focuses on Mandarin tones. Since the major cues to tone are both spectral (F0 height and direction) and temporal (turning point, TP), tones provide a good test case to evaluate effects of context. The present study examined production variation due to changes in speaking rate and tonal context. Twelve speakers (6M, 6F) produced target syllables with the four different Mandarin tones at fast, normal and slow speaking rates. These syllables appeared at the end of a carrier sentence, following either a high-level tone (Tone 1) or a high-falling tone (Tone 4). Speaking rate had a similar effect across all tones and consonants while preceding context resulted in changes to temporal parameters such as turning point.

Paper P2.22 (Presenter at poster: 15:00-16:45)
The effect of tonal context on second language learners' Mandarin tone production

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This study investigates the effect of tonal context on L2 learners' production of Mandarin tones. Ten English-speaking learners of Mandarin were asked to imitate native productions of disyllables encompassing all possible tone combinations. Their productions were evaluated by two native judges. The results show that the learners' error patterns vary depending on the tonal context. Specifically, their T2→T3 error is most common when followed by T1, while the T3→T2 error is most frequently observed when preceded by T4. F0 measurements were conducted on the T2T1 and T4T3 sequences produced by the native talker and selected learners. The comparison reveals that the learners overly lower the onset and valley of their T2 when the following tone has a high onset, and raise T3 to a higher offset when the preceding tone ends in a low pitch. These findings suggest a dissimilatory effect of tonal context on L2 learners' production.

Speech Prosody I: Syllabic and Lexical Aspects
Tuesday, August 11, 2015, 15:00-16:45

Paper P2.23 (Presenter at poster: 15:00-16:45)
Categorical perception of lexical stress: The effect of manipulated duration

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A recent production study found that duration is the main cue in realization of lexical stress in Hebrew. In order to examine this perceptually, two minimal pairs of bisyllabic words differing only in their stress patterns were uttered within a carrier sentence. Target words were then extracted and their vowel durations were manipulated in eight steps, either downward or upward, to form smooth transitions from original penultimate duration patterns to ultimate, and vice versa. These stimuli were then presented to 15 listeners.

Results show that for most listeners, the changes in duration were sufficient to cause a categorical change in perception of the stress pattern.

Paper P2.24 (Presenter at poster: 15:00-16:45)
Categorical or continuous production in lexical pitch accent contrasts of Korean

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The current research investigated the relation of categorization and production using imitation and production paradigm. More specifically, the imitation and production responses of this experiment were analyzed in order to find out individual speaker differences in lexical pitch accent categories of North Kyungsang Korean. A significant number of imitation and production responses favoured the categorical production account, although in general such responses are dependent on lexical pitch accent types. According to the current results, the lexical pitch accent contrasts seemed to show individually different patterns. That is, some participants showed strict categorical production, whereas others showed continuous effects in production of pitch contour in North Kyungsang Korean. On the basis of the relation of categorization and production in current research, the results revealed that the relation of categorization and production relies on individual speakers' cognitive systems.

Paper P2.25 (Presenter at poster: 15:00-16:45)
Lexical stress contrastivity in typically developing Italian children

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There has been substantial progress in understanding the production of individual speech sounds. Much less is known about prosodic aspects of speech production. Lexical stress is the prosodic contrast between strong and weak syllables within single words (compare 'INcense' with 'inCENSE' in English). The ability to achieve stress contrastivity during speech production shows a protracted developmental trajectory in healthy children and can be atypical in some individuals within certain populations (e.g., autism spectrum disorders). Almost all previous research in this area has examined speakers of English. One important gap in our understanding is whether lexical stress production seen in typically developing children is similar across languages. Here we provide new data regarding lexical stress production in typically developing Italian children (3-5 years), and a comparison with published data from English-speaking children.

Paper P2.26 (Presenter at poster: 15:00-16:45)
Segmental context effects on temporal realization of Estonian quantity

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The Estonian three-way quantity system is usually described by a robust foot-level compensatory mechanism of the stressed and the unstressed syllable durations. Beneath the three-way foot-level contrast, the quantity oppositions can be realized by seven different segmental combinations of the initial vowel and the following intervocalic consonant length. In this work we investigated the effects of context

dependency on durational patterns marking this 7-way contrast. We observed a strong influence of the word initial consonant and vocalic quality context on the durations of individual segment in different quantity combinations. The results show a complex relation between the intrinsic phonemic properties and suprasegmental features. Finally, we argue that the effects of segmental context and natural variation of phonetic realization might in some cases combine to be greater than average differences between quantity degrees.

Paper P2.27 (Presenter at poster: 15:00-16:45)
Syllabic structure and informational content in English and Spanish

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This paper investigates the potential role of syllabic structure in characterising the informational content of running speech using an energy-based measure (the cochlea-scaled entropy, CSE index). We computed the CSE and compared how it aligned to the energy envelope for a corpus of English and Spanish sentences. We also compared these measures to syllabic structure, which differs markedly between the two languages. Results show that English exhibits a clear difference between informational and energy peaks in relation to the phonetic syllable nucleus, defined here in terms of the temporal mid-point of adjacent vowels. In contrast, in Spanish, both peaks align. Further, energy peaks occur later in the syllable in English, whereas they precede the nucleus in Spanish. Evaluation of internal syllable timing showed a more regular timing pattern in Spanish than English, which we suggest could have an implication for automatic selection of information bearing elements of speech.

Paper P2.28 (Presenter at poster: 15:00-16:45)
F0, voice quality, and Danish stød revisited

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Danish stød is a syllable prosody, hitherto described as a kind of creaky voice with tonal side effects. One such is the well established, though not ubiquitous, abrupt lowering of F0 towards the end of the syllable. Eli Fischer-Jørgensen found, in the 1970s and 1980s, a difference also in the beginning of stressed syllables: F0 is higher in the beginning of syllables with stød. Confirming her findings 40 years later was straightforward in read word lists and as a clear trend in non-scripted monologues. In dialogues, however, the modest effect of stød on onset F0 is overshadowed by the greater variation in overall frequency range. Higher F0 onset is present also in unstressed syllables with stød, though of lesser magnitude. The results support a characterization of Danish stød as compressed, rather than creaky voice. They also demonstrate the viability of controlled speech materials for investigations of finer prosodic detail.

Paper P2.29 (Presenter at poster: 15:00-16:45)
Vowel epenthesis in Japanese speakers' L2 English

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This study investigated how vowel epenthesis, a typical

suprasegmental error produced by Japanese learners of English, is realized in their speech production of L2 English. We investigated two aspects: (i) whether loanword epenthesis phonology in Japanese transfers to English speech production, and (ii) how learners' English proficiency level affects vowel epenthesis. In Japanese loanword phonology, different vowels are inserted in certain phonological environments to maintain Japanese syllable structure. We analyzed speech data from the J-AESOP corpus to examine whether vowel epenthesis in L2 English of L1 Japanese learners resembles the patterns of loanword adaptation in connection with the learners' proficiency level. The results showed that while fluent learners produced fewer epenthetic vowels, the qualities of the vowels exhibited similar patterns to loanword adaptation, regardless of learners' proficiency level. This indicates that learners' L2 proficiency level affected vowel epenthesis in quantitative rather than qualitative aspects.

Paper P2.30 (Presenter at poster: 15:00-16:45)
Developmental change in English stress manifestation by Japanese speakers

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This study investigated the developmental change in the phonetic realization of English stress, using corpus data of Japanese English learners with varying proficiency. Previous studies demonstrated that highly proficient Japanese learners of English can produce native-like English lexical stress in terms of intensity, F0, and vowel duration, but not vowel quality. The results of our study showed that the contrasts in intensity, F0 and duration were manifested by all proficiency groups while spectral contrast was consistently absent. In addition, significant differences in vowel duration were found between native speakers and Japanese speakers of low-to-medium English proficiency level. The results imply that Japanese mora-timed rhythm is an obstacle in manifesting native-like lexical stress. These two findings suggest that it is more difficult to overcome L1 interference of segmental phonology than of suprasegmental phonology.

Speech Prosody I: Sentence Type

Tuesday, August 11, 2015, 15:00-16:45

Paper P2.31 (Presenter at poster: 15:00-16:45)

Speech rhythm and sentence type: Analyzing the durational properties of Olivenza Portuguese, Olivenza Spanish, and Castilian Spanish

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The present paper compares the rhythmic properties of two contact varieties, Olivenza Portuguese (OP) and Olivenza Spanish (OS), with those of Castilian Spanish (CS). Based on the analysis of a corpus comprising recordings of declarative, interrogative, and imperative sentences, we show that OS generally displays intermediate %V, VarcoV, and VnPVI scores between the ones for CS and OP. The greater or lesser differences between the three varieties are explained by re-

ferring to phonological properties such as (presence or absence of) vowel reduction, vowel and consonant elision, and specific lengthening effects. Our results suggest that sentence modality contrasts seem to be conveyed by rhythmic differences in the varieties under investigation: While durational differences between declaratives and imperatives were found in all of the three varieties (the differences being greater in OP and OS than in CS), declaratives and interrogatives only differ from one another in OP and OS.

Paper P2.32 (Presenter at poster: 15:00-16:45)

The phonetics and phonology of the Polish vocative chant

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The Polish vocative chant is a melody used, as in other languages, to call someone for a routine reason. Three repetitions of 12 Polish names (1-4 syllables long, 3 names per syllable count) were elicited from 16 speakers using a Discourse Completion Task. The results, based on data from 11 speakers (6 female), showed that the contour ends in a small rise (not a plateau as in other languages), while the initial rise aligns with the end of the stressed syllable. In poly-syllabic names, the contour starts with low F0 and the rise begins immediately before the (always penultimate) stress. Based on these data and comparisons with contours used in wh-questions and in other types of Polish vocatives, we analyse this contour as LH*!H-H%. The implications of this analysis for autosegmental models of intonation are discussed.

Paper P2.33 (Presenter at poster: 15:00-16:45)

Intonational signalling of sentence type in Northern Welsh

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This paper examines the effect of sentence type on the scaling and alignment of pitch peaks in Anglesey Welsh. The analysis considered a corpus of speech from six Welsh-English bilingual speakers. The sentence types considered for analysis were statements, yes-no questions, wh-questions and declarative questions. It was found that across speakers the pitch peaks were scaled higher in questions than in statements. Furthermore there was gradable scaling in nuclear pitch peaks as a function of the lexical marking of interrogativity available in the sentences. This ties in with Haan's Functional Hypothesis [5] whereby less lexically marked questions are predicted to be more intonationally marked. It was also found that for prenuclear pitch peaks there was a tendency for later alignment as a function of the lexical cues for interrogativity, although this later alignment was not present in nuclear position.

Paper P2.34 (Presenter at poster: 15:00-16:45)

The multiple prosodic cues differentiating questions and statements in Miami Cuban Spanish

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Previous work on the intonational phonology of Miami Cuban (MC) Spanish [1, 2, 3] has revealed that broad focus declaratives and absolute interrogatives have the same nuclear tones. In laboratory speech, [2] found that these two

sentence types, when compared paradigmatically, show significant differences in peak scaling and pitch range [2]. The present study examined peak scaling with syntagmatic comparisons between nuclear and prenuclear peaks as well as paradigmatic comparisons of pitch range and f0 peak timing in laboratory and semi-spontaneous speech. The results reveal significant differences in peak scaling and pitch range, but no differences in peak timing, confirming [2]. However, preliminary perception results reveal no difference in listener interpretation when only peak scaling is manipulated, suggesting free variation or additional cues to sentence modality in this dialect.

Paper P2.35 (Presenter at poster: 15:00-16:45)

Exemplar-based classification of statements and questions in Cantonese

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Previous research has shown that exemplar theories are a promising model of speech perception. Few studies have applied exemplar-based models to intonation perception. This study investigates how intonational exemplars are represented in memory and classified by a computational model. An exemplar-based model was tested with Cantonese statements and echo questions. Each test token was represented with eleven F0 measurements at equidistant time points from the start to the end of the periodicity of the final syllable in the utterance. Three simulations tested the model's performance in classifying these utterances when varying degrees of variation were presented to the model. Results indicate that the model can accurately distinguish between statements and echo questions in Cantonese, based on the intonation of just the final syllable, without normalization for speaker and gender.

Paper P2.36 (Presenter at poster: 15:00-16:45)

Intonation of statements and questions in Cantonese English: Acoustic evidence from a smoothing spline analysis of variance

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This paper looks into the intonational use of pitch in Cantonese English. It aims at providing phonetic evidence for the intonation of statements and questions in interaction with tones identified at lexical level. A smoothing spline analysis of variance was fitted to the audio-recording data from six speakers of Cantonese English with R in order to generate smoothing splines at 95% confidence intervals for determining whether the same tone (M, H, or L) in different utterance types (context-neutral utterances, statements and questions) differ from each other significantly in different word positions and utterance positions. It is found that there are clear boundary targets for statements (L%) and questions (H%), indicating that there are different boundary tones. It also finds out that there is a lowering of pitch for tones in non-utterance-final words for questions than other utterance types, which creates an enhancing effect of a more salient H%.

Speech Production and Articulation I: Articulation of Vowels

Tuesday, August 11, 2015, 15:00-16:45

Paper P2.37 (Presenter at poster: 15:00-16:45)

Articulatory patterns of Russian diphthongized vowels:
Pilot MRI investigation

*Kedrova, Galina; Anisimov, Nikolay and Ushakov, Vadim
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This paper presents the main results of a targeted MRI-investigation of articulatory patterns of the Russian diphthongised (gliding) vowel phonemes, vowel /i/ first and foremost. The investigations relevance is assured by serious general discordance of opinions discussing articulatory patterns of the diphthongised Russian vowel /i/. Our research revealed critical differences in the vowel's articulatory dynamic patterns caused by the specific role of core articulators in the formation of heterogeneity of a speech sound. The first articulatory pattern supports gliding articulation of the vowel /i/ through gradual displacement of tongue root and tongue blade/tongue dorsum towards the anterior area of the buccal cavity; the other articulatory pattern is spatially and temporary realized through the complex interaction of both tongue transformations and a special mandible articulatory gesture. Such exceptional jaw activity being unknown in common descriptions of the Russian articulatory base would make Russian vowel /i/ a singular item within the phonetic system of the Russian language.

Paper P2.38 (Presenter at poster: 15:00-16:45)

Articulatory and acoustic correlates of the mid-central vowel

*Menezes, Caroline; Moote, Kelley; Garon, Alexis; Baker, Jordan; Lucarelli, Marisa; Nichols, Kristyn and Plefrey, Brandy
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This paper reports on the articulatory and acoustic correlates of the mid-central vowel (schwa) in an attempt to find out the perimeter of this vowel in both the articulatory and acoustic vowel space of female American English speakers. F1xF2 plots were used to determine the acoustic vowel space. The articulatory vowel space was determined by plotting the maximum vertical displacement of the jaw from the bite plane against the maximum horizontal displacement of the tongue blade from normal resting position. Results indicated that speakers had significantly different articulatory strategies for the production of the schwa, but no speaker differences were observed in the acoustic signal. The acoustic vowel space of this vowel when plotted against the Hellenbrand et al., study appeared to be closer to the back high vowel /u/. The placement of the target word in the utterance had no effect on its acoustic or articulatory realization.

Paper P2.39 (Presenter at poster: 15:00-16:45)

Defying gravity: Formant frequencies of English vowels produced in upright and supine body position

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This case study investigated the effect of body position on the first three formants (F1, F2, F3) of the British English vowels /i:/, /ɛ/, /æ/, /ɔ:/ and /u:/ produced by one male native speaker. While F1 remained unaffected significant changes in F2 and F3 were found for certain vowels when they were produced in a supine rather than in an upright position. F2 was significantly lower for /i:/, /ɛ/ and /æ/ but not for /ɔ:/ and /u:/ when the speaker was lying. Lowering of F3 was significant for /i:/, /æ/ and /u/>. These preliminary results obtained from one subject suggest that the posture of the speaker and hence gravity influence vowel articulation and its acoustic outcome. However, not all vowels and all formants are affected in the same way.

Paper P2.40 (Presenter at poster: 15:00-16:45)

Measuring magnitude of tongue movement for vowel height and backness

*Hall, Kathleen Currie; Allen, Claire; McMullin, Kevin; Letawsky, Veronica and Turner, Alannah
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Optical Flow Analysis (OFA) has recently been introduced as a fast, easy, and reliable means of extracting articulatory information from ultrasound video ([2], [3], [6], [9]). This paper illustrates how one primary measurement that is extracted using OFA, magnitude of movement, correlates with the standard phonological vowel categories of height and backness. By establishing a baseline for these measures, we pave the way for future studies to examine how magnitudes change in particular phonological, social, or other contexts.

Clinical Phonetics I

Tuesday, August 11, 2015, 15:00-16:45

Paper P2.41 (Presenter at poster: 15:00-16:45)

Developmental dysarthria in a young adult with cerebral palsy: A speech subsystems analysis

*Kuschmann, Anja and Neill, Rebecca
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The speech of children with cerebral palsy (CP) and dysarthria is associated with limited breath control, voice quality changes and imprecise articulation. These problems can reduce speech intelligibility, which can act as a barrier to successful interactions. Whilst the impact of the speech problems is well recognised, research on the nature of the speech impairment is relatively limited. This study aims to provide a detailed description of the speech production abilities of a 16-year old boy with CP using a speech subsystems approach. It will examine which subsystems might be affected that could impact upon intelligibility in this speaker. To achieve this, various speech samples were analysed regarding a range of acoustic and linguistic parameters and subsequently compared to the performances of his typically developing twin brother. Results showed that changes in respiration, phonation and articulation may contribute to the intelligibility issues experienced by the speaker with CP.

Paper P2.42 (Presenter at poster: 15:00-16:45)

Retrospective longitudinal analysis of phonetic and

phonological cleft palate speech characteristics

*Schulz, Erika; Cohen, Wendy; Lowit, Anja and Crampin, Lisa
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In this study, we analysed phonetic and phonological consonant characteristics of cleft palate speech (CPS) at ages 5 and 10 in cleft palate with/without cleft lip (CP±CL) based on Cleft Audit Protocol for Speech – Augmented (CAPS-A) data collected in the Dental Hospital in Glasgow. The nature and extent of CPS characteristics at different ages were investigated. Video-recordings of 42 cleft palate (CP), unilateral cleft lip and palate (UCLP) and bilateral cleft lip and palate (BCLP) boys and girls were analysed based on narrow transcription and automatic PROPH (profile of phonology) of types of articulation features. Results of this study showed that CP±CL children produce a significantly higher number of phonetic CPS characteristics than phonological processes at both ages.

Paper P2.43 (Presenter at poster: 15:00-16:45)
Automatic speech processing for dysarthria: A study of inter-pathology variability

*Laaridh, Imed; Fredouille, Corinne and Meunier, Christine
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Despite their large advances, especially for consumer applications, automatic speech technologies still encounter very huge difficulties when they are exposed to dysarthric speech. However, they were presented very early as potential solutions to provide objective tools to deal with speech disorders in order to help clinicians in their clinical practice and patients in their everyday lives. In order to understand the difficulties encountered by automatic speech processing, this paper investigates the reliability of a simple automatic phone alignment when dealing with dysarthric speech. Notably, the corpus used involves French read-speech recordings produced by patients suffering from four different pathologies, exhibiting three different types of dysarthria. The observations of the segmentation outputs yielded by the automatic tool (compared with a manual segmentation) according to the pathologies, the type of dysarthria and different phonetic categories reveal a very large heterogeneity of behavior between pathologies, and within the same pathology.

Paper P2.44 (Presenter at poster: 15:00-16:45)
An acoustic study of sustained vowels produced by patients after thyroid surgery

*Fauth, Camille; Vaxelaire, Béatrice; Rodier, Jean-François; Volkmar, Pierre Philippe and Sock, Rudolph
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The aim of this study is to assess the consequences of thyroid surgery on the voice of patients, in order to identify various perturbations which this surgery may provoke, and also to reveal possible compensatory strategies or readjustments that the patient may develop. The assessment was based on the analysis of acoustic signals, from which a large amount of cues related to voice quality was extracted. The experiment deals with the spectral characteristics of the voice of patients who underwent thyroidectomy, with no laryngeal paralysis. Our interpretations, made from the acoustic data, reveal perturbations of gestures on the glottal level, with readjustment strategies varying according to patients. The concept of a

"target" as a control space for execution of possible articulatory and acoustic entities, which are perceptually acceptable, seems particularly relevant in this study, since disordered speakers reorganise their productions according to their own physiological and anatomical constraints caused by the disorder.

Paper P2.45 (Presenter at poster: 15:00-16:45)

Helping children learn non-native articulations: The implications for ultrasound-based clinical intervention

*Cleland, Joanne; Scobbie, James M.; Nakai, Satsuki and Wrench, Alan
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An increasing number of studies are examining the effectiveness of ultrasound as a visual biofeedback device for speech production training or therapy. However, no randomised control trials exist. We compared the success of typically-developing children learning new articulations with and without ultrasound biofeedback. Thirty children aged 6-12 were randomly assigned to 2 groups: Group U were taught novel (non-English) consonants and vowels using ultrasound in addition to imitation, modelling, articulatory descriptions and feedback on performance. Group A were taught the same speech sounds, using the same methods but in the absence of ultrasound visual biofeedback. Results showed that both groups of children improved in their production of the novel sounds with the exception of the high back vowels [u,u]. No advantage for Group U was found, except for the palatal stop [c].

Paper P2.46 (Presenter at poster: 15:00-16:45)

Spatial & temporal variability of sibilants in children with Down's syndrome

*Timmins, Claire and Wood, Sara
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This paper presents findings from EPG analysis of word initial /s/ and /ʃ/ in twenty five children with Down's syndrome (DS) and ten cognitively age-matched typically developing children (TD). Spatial and temporal variability measures show evidence of increased variability in all attempts of target /s/ and /ʃ/ for the speakers with DS. The findings also show evidence of high levels of spatial variability in children with DS and typically developing children in perceptually acceptable productions of the target sounds. These findings support previous research that links speech production difficulties in children with DS to impaired speech motor ability.

Paper P2.47 (Presenter at poster: 15:00-16:45)

Tracking depressed mood using speech pause patterns

*Wolters, Maria K.; Ferrini, Luis; Farrow, Elaine; Szentagotai Tatar, Aurora and Burton, Christopher D.
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The speech of people with depression often shows clear signs of their condition (e.g., flat intonation, slow speech, long pauses), but it is not clear to what extent these signs covary with diurnal fluctuations in mood. In this paper, we report results from a pilot longitudinal study where 11 people with depression tracked various aspects of their mental health for a month. This included a daily mood tracker and regular completion of speech tasks. Speech tasks were de-

signed to be emotionally neutral and require different levels of automaticity. We found that participants differed in their willingness to complete the speech tasks, and that preliminary analyses show no clear link between mood and prosody. We discuss implications of this study for tracking depressed mood using speech in real-life applications.

Sociophonetics I: Vowel and Consonant Production

Tuesday, August 11, 2015, 15:00-16:45

Paper P2.48 (Presenter at poster: 15:00-16:45)

Phonetic variation in Standard Scottish English: Rhotics in Dundee

*Jauriberry, Thomas; Sock, Rudolph and Hamm, Albert
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Research on Scottish English /r/ has mainly focused on the urban centres of Glasgow and Edinburgh, while the phonetic variation of this sound remains largely unknown in other cities. This paper aims at providing new data to characterize Standard Scottish English and one of its prominent features by analyzing the variation of both prevocalic and non-prevocalic /r/ in Dundee. Though age and gender have some influence on /r/ production, the most significant factors are phonetic and phonological environments. Variants include not only taps and approximants, but also fricatives, affricates, and vocalic realizations, though the speakers remain essentially rhotic.

Paper P2.49 (Presenter at poster: 15:00-16:45)

Phonology in new varieties of English: Hong Kong English diphthongs

*Setter, Jane; Ryder, Chris and Mok, Peggy Pik Ki
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Studies of vowels in Hong Kong English (HKE) have revealed that it has diphthongs which are not dissimilar from British English (BrE). However, impressionistically, diphthongs in HKE can and do sound different. This paper looks at two perceptual phenomena: monophthongisation of GOAT; and coda consonant loss in words containing closing diphthongs followed by a geminate alveolar plosive. We indicate that patterns of production exist which could cause problems of intelligibility for listeners who are less familiar with the variety.

Paper P2.50 (Presenter at poster: 15:00-16:45)

Merger within an individual

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The merger of vowels in a language over time has been a productive area of study, yet how these changes arise remains an ongoing matter of debate. A generally accepted hypothesis is that mergers arise within individuals, who are thought to become merged over time as a result of contact with other merged individuals. A further prediction states that unconditioned mergers, such as the low back merger of /a/ and /ɔ/ in American English, are particularly vulnerable to change, whereas conditioned mergers, such as pre-velar raising of /æ/ before /g/, where the vowels of bag and beg

are similar, are more resistant to change within the individual. Neither prediction has been tested against longitudinal data from the same speakers over time. Here, a study is reported showing some support for the predictions of change over time, but with a caveat: individuals are more likely to show change related to unconditioned mergers than conditioned ones: the opposite of the expected pattern.

Paper P2.51 (Presenter at poster: 15:00-16:45)

DRESS down: /ɛ/-lowering in apparent time in a rural Scottish community

*Holmes-Elliott, Sophie and Smith, Jennifer
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This paper presents a sociophonetic investigation of /ɛ/-lowering in apparent time. The data come from 24 speakers, across three generations from Buckie, northeast Scotland (12 males, 12 females). Acoustic analysis of the DRESS-vowel reveals that it is lowering in apparent time. Inspection of the constraints reveals an interaction of internal and external constraints. Analysis of the phonetic context revealed that a following [l] promoted DRESS lowering. However, this conditioning was only significant for the young females who were shown to be leading the change. The results presented here are related to broader phonological characteristics of the Buckie dialect as well as ongoing changes in a number of different English varieties.

Paper P2.52 (Presenter at poster: 15:00-16:45)

The pronunciation of orthographic <ä, äh> in Standard Austrian German

*Hobel, Bettina; Moosmüller, Sylvia and Kasess, Christian
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A graphemic representation of vowel mutated a is first documented in Middle High German texts. As a consequence of a strict letter-to-letter pronunciation, graphemic <ä> was pronounced as [ɛ(:)] in Early New High German and was subsequently prescribed in pronunciation dictionaries. Especially the pronunciation of long [ɛ:] has become an issue of debate. Many scholars point out that [ɛ:] had merged with [e:]. In the current investigation, it is tested whether speakers of Standard Austrian German merge the vowels orthographically represented as <ä, äh> and <e, ee, eh>. An acoustic analysis of all <ä, äh> and <e, ee, eh> of read and spontaneous speech of ten speakers was performed. No statistically significant differences were obtained: thus, a merger is assumed. The qualitative analysis proved some occasional realisations of [ɛ:] in read speech. It is concluded that some speakers adhere to a prescriptive norm which is sporadically activated in formal contexts.

Paper P2.53 (Presenter at poster: 15:00-16:45)

Cross-linguistic vowel variation in Saterland: Saterland Frisian, Low German and High German

*Heeringa, Wilbert; Schoormann, Heike and Peters, Jörg
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This study investigates the vowel space of trilingual speakers of Saterland Frisian, Low German, and High German. The three vowel systems show differences in the number of distinct categories but share the majority of vowel qualities. The speakers were instructed to read vowels of all three languages in a /hVt/ frame. We examine whether

the dispersion and size of the vowel space as well as interlanguage variability of individual vowels correlate with the number of vowel categories. Additionally, systematic cross-linguistic differences were measured regarding duration and mid-vowel F1 and F2. High German monophthongs were found to be produced with longer and more variable duration. Moreover, High German monophthongs were produced with smaller F1 and larger F2 values than the respective Saterland Frisian and Low German categories. These results suggest that the subjects may use the same base-of-articulation for Saterland Frisian and Low German but not for High German.

Paper P2.54 (Presenter at poster: 15:00-16:45)

San Francisco English and the California vowel shift

Hall-Lew, Lauren; Cardoso, Amanda; Kemenchedjieva, Yova; Wilson, Kieran; Purse, Ruaridh and Saigusa, Julie

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San Francisco English has been previously identified as distinct from Californian English, based on its maintenance of a low back vowel distinction [13]. Subsequent work has shown participation in the low back merger and other Californian sound changes [15]. We present an analysis of the front and central vowels involved in the California Vowel Shift: KIT, DRESS, TRAP, and STRUT. Previous work in San Francisco [8] found raised DRESS after velars, and raised KIT, DRESS, and TRAP before nasals. Elsewhere in California [11], KIT and DRESS are lowering; TRAP is raising before nasals and backing before orals ('the nasal split'). We examine vowels produced in read speech by 24 speakers stratified by age, gender, and ethnicity. Results show apparent time evidence of DRESS lowering/backing and the TRAP 'nasal split'. Effects of style and gender raise further questions. The results point to San Francisco English converging on broader regional patterns.

Paper P2.55 (Presenter at poster: 15:00-16:45)

Maintenance of the Breton mixed mutation

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This paper investigates the mixed mutation in Breton, an endangered language which has seen a gap in transmission. Initial consonant mutation is a highly salient feature of the language, but susceptible to change in the context of widespread bilingualism and an ageing population of speakers. We investigate to what extent a younger generation is continuing to maintain the mixed mutation, and find that young adults achieve proficiency equivalent to that of older speakers. Children acquire this feature very late, and need sustained Breton input beyond the early teenage years. To investigate the nature of the mutation itself, we examine measurements of a crucial alternation, which show that acoustically there is little difference in the realisation of the mutation, and this feature is being maintained.

Paper P2.56 (Presenter at poster: 15:00-16:45)

Production of FACE and GOAT by Slovak and Czech immigrants in Edinburgh

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This study examines the stylistic constraints on the pronun-

ciation of the FACE and GOAT lexical sets as spoken by Slovak and Czech female immigrants who permanently reside in Edinburgh, Scotland. We undertake an acoustic analysis of monosyllabic words taken from a structured interview, a reading passage, and a wordlist to compare these speakers to fluent learners of RP English living in Slovakia, specifically investigating immigrants' acquisition of the Scottish English monophthongal variant. The results suggest that long-term immigration has a significant impact on pronunciation patterns, although more formal speech styles may trigger a reversion to instructed L2 norms.

Paper P2.57 (Presenter at poster: 15:00-16:45)

A sociophonetic study of VOT and Polish transnational identities in the UK: Some preliminary results

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This paper examines Voice Onset Time (VOT) of Polish voiceless stops in natural speech of members of the Polish transnational community in the United Kingdom. The results presented here are part of a larger sociophonetic project and suggest that aspirated voiceless plosives in Polish, characterized by longer mean VOTs, are associated with a cosmopolitan transnational identity. In contrast, shorter mean VOTs are typical of the speech of members of the community with a more nationally Polish identity.

Paper P2.58 (Presenter at poster: 15:00-16:45)

A first glimpse of mid back vowels in Girona Catalan

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Mid back vowels [ɔ] and [ɔ̃] appear to be merging in the Catalan spoken in the region of Girona. In this brief paper, we present preliminary data on the production of these vowels in one of the 12 designated survey points for the study of the phenomenon, the area of Ter-Brugent. The first results in this area show that our speakers present an almost complete merger of the mid back vowel pair, and no remarkable differences are observed with regard to gender nor age.

Paper P2.59 (Presenter at poster: 15:00-16:45)

Acoustic characteristics of closing diphthongs in Bahamian Creole

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Reporting the results of an acoustic analysis of closing diphthongs produced by 15 speakers of Bahamian Creole, this paper links phonetic features with variation in social class. The inventory analysed includes four vowel categories, represented by the lexical sets CHOICE, NURSE, MOUTH, and PRICE. In addition to the extent of spectral change in F1/F2 space, the relative position of the diphthong onsets was investigated. The findings reported here complement earlier impressionistic accounts and extend our understanding of the phonetic variation to be found within the Bahamian creole continuum.

Paper P2.60 (Presenter at poster: 15:00-16:45)

A phonetic analysis of back vowel raising in Dublin English

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This study uses acoustic phonetic techniques to verify reports of back vowel raising in Dublin English and re-interpret those changes. Hickey [9] describes the raising of a series of back vowels as characteristic of a new variety of Dublin English. He interprets this raising as a shift away from the open realisations of vernacular forms of Dublin English. This study confirms the presence of a broad pattern of back vowel raising between two generations of Dubliners, observing NORTH raising along with social stratification of THOUGHT that does not appear to be a recent development. The results suggest, however, that inner city Dubliners are participating in NORTH raising, and that the STRUT/FOOT contrast is being lost among middle-class Dubliners. These developments weaken the argument that ongoing change constitutes divergence from vernacular forms of Dublin English, suggesting instead a broader reconfiguration of the vowel systems of Dublin English.

08:00-18:00	Registration (<i>Hall 1</i>) and Exhibition (<i>Hall 2</i>)				Speaker room (<i>Etive</i>)		
09:00-09:45	3.1 Phonetics of Celtic Languages 3.2 Clinical Phonetics: Voice and Prosody ORAL Session 3				3.3 Aspects of Rhythm 3.4 Fricatives around the World 3.5 Psychophonetics	3.6 Vowel Acoustics	3.7 Information Status
09:45-11:30	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 1 (<i>Hall 1</i>)		
11:30-12:30	4.1 Prosody of Questions 4.2 Vowel Production ORAL Session 4 4.3 Sounds of the World's Languages 4.4 Phonetics-Phonology Interface II 4.5 Memory and Speech 4.6 Topics in Speech Production and Perception 4.7 Vowel Perception in L2						
12:30-14:00	LUNCH			JIPA meeting (<i>Aish</i>)		Phonetica Editorial Board meeting (<i>Fyne</i>)	
14:00-15:00	5.1 Acoustic and Articulatory Variation ORAL Session 5 5.2 Prosody around the World 5.3 Consonant and Vowel Duration 5.4 Speech Comprehension 5.5 Non-Native Speech: Production and Perception 5.6 Multimodal Phonetics 5.7 Patterns of Word Stress						
15:00-16:45	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 2 (<i>Hall 1</i>)		
16:45-17:45	6.1 Obstruents around the World ORAL Session 6 6.2 Focus on Focus 6.3 Ultrasound Methodology 6.4 L2 Prosody 6.5 Perceptual Learning 6.6 Topics in Speech Acoustics 6.7 Prosody and Speech Production						
17:45-18:45	Labphon AGM (<i>Dochart 2</i>)						

DAY 3: Wednesday, August 12, 2015

ORAL SESSION 7

7.1: Articulation and Coarticulation

Wednesday, August 12, 2015, 09:00-10:00, Alsh 1

Chair: Patrycja Strycharczuk

Session 7.1, Paper 1 (09:00-09:15)

Structured nonstationarity in articulatory timing

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Many experiments investigating speech articulation examine the influence of linguistic or paralinguistic factors on articulatory timing. The current experiment differs from these by focusing on unconditioned variation—i.e. statistical noise—in articulatory timing. The aim is to assess whether distributions of intervals representing the relative timing of articulatory movements are well-modelled with a constant parameter distribution, such as a Gaussian with fixed mean and variance. Several hundred productions of the same target word were elicited from participants in a task where feedback encouraged identical productions on all trials. The results show that the distributions of articulatory timing intervals are not consistent with a constant-parameter model. Instead, distribution parameters show unconditioned drift over time, exhibit sporadic discontinuous transitions between modes, and have a complex, dynamic correlational structure. These results call into question typical assumptions of articulatory models.

Session 7.1, Paper 2 (09:15-09:30)

Factor analysis of vocal-tract outlines derived from real-time magnetic resonance imaging data

Toutios, Asterios and Narayanan, Shrikanth

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A factor analysis of vocal-tract outlines derived automatically from real-time magnetic resonance image (rtMRI) sequences has been performed. The analysis results in a compact representation of vocal-tract shapes, where every utterance is represented by a small set of trajectories corresponding to weights in linear combinations of linguistically interpretable vocal-tract deformations. Vocal-tract shapes can be reconstructed with good accuracy from these trajectories. The work uses information from a significantly larger number of speech frames compared to previous attempts in articulatory modeling. The proposed method is illustrated through a case study of rtMRI data corresponding to 250 sentences spoken by a single speaker and underscores the promise of the methodology for phonological analysis and

articulatory synthesis.

Session 7.1, Paper 3 (09:30-09:45)

Onset-vowel timing as a function of coarticulation resistance: Evidence from articulatory data

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We recorded articulatory data to investigate the influence of consonantal coarticulation resistance on consonant-vowel timing in Polish onset clusters. While recent studies found different onset-vowel timing patterns depending on the position of the sibilant within the cluster, it is widely unknown how onset-vowel timing interacts with different degrees of coarticulation resistance of the vowel-adjacent consonant. Thus we examined articulatory data of singleton and cluster onsets with different vowel-adjacent consonants varying in their coarticulation resistance. The results suggest a systematic change in CV overlap between singleton and cluster condition with most overlap for less resistant consonants /m, p, k/ and no changing overlap for most resistant consonants /s, ſ/. Sonorants /n, l/ show intermediate CV overlap patterns. These results confirm that onset-vowel timing interacts with coarticulation resistance and strengthen the assumption that syllable organization depends on the composition of the entire syllable.

Session 7.1, Paper 4 (09:45-10:00)

Articulatory measures of planned and unplanned coarticulation

Katsika, Argyro; Whalen, Douglas H.; Tiede, Mark and King, Hannah

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The extent and sources of coarticulation remain an active topic of research. Whalen [18] found that vowel-to-vowel coarticulation occurred even when the utterance was initiated before an intervening consonant's identity was known. Here, we address vowel-to-vowel coarticulation in the articulatory domain, replicating [18]. Spoken English nonsense strings [æ'bVCə] were recorded with electromagnetic articulography. The V was [i] or [u] while the C was [b] or [p]. In one condition, the V was known but the C was not; it was reversed in the other condition. The missing information appeared once phonation began. Our results revealed speaker-dependent motor control strategies, with anticipatory effects of the V on the tongue position of the initial schwa being present for speakers who anticipated the V identity, but not otherwise. These patterns are consistent with the position that coarticulation is planned, corroborating Whalen's [18] conclusions.

7.2: Sociolinguistics and Speech Perception

Wednesday, August 12, 2015, 09:00-10:00, Boisdale 1

Chair: Lauren Hall-Lew

Session 7.2, Paper 1 (09:00-09:15)

Role of pitch in perceiving politeness in Korean

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It has been found that Korean speakers lower their average voice pitch when speaking politely [16, 17], contradicting the idea that high pitch is polite across all cultures, as proposed by Ohala's Frequency Code hypothesis [e.g. 12]. This study looks at pitch as a perceptual cue to politeness in Korean. Ten Korean listeners heard short utterances from eight different speakers and judged whether each utterance was spoken in a polite (contaymal) or informal (panmal) register. Results indicate that F0 manipulation did affect politeness perception, but with an unexpected gender effect: High pitch was perceived as polite by Korean females and as informal by Korean males. These findings suggest a mismatch of politeness production and perception, and they reveal important gender differences in how the same acoustic cues are imbued with different kinds of politeness meanings.

Session 7.2, Paper 2 (09:15-09:30)

Limited evidence for social priming in the perception of the BATH and STRUT vowels

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It has been claimed that priming listeners with information about a speaker's regional background can lead to predictable biases in the categorization of their speech [7], reflecting the influence of socially-indexed episodic representations on speech perception [4, 5, 6]. The present study tested for this effect among a group of 40 speakers of Southern Standard British English, attempting to replicate Niedzielski's [7] vowel-matching experiment in a new context. Listeners heard a speaker from Sheffield reading a set of sentences containing BATH and STRUT words utterance-finally. After each sentence, they listened to a continuum of re-synthesized vowel tokens and matched them to the speaker's natural realizations. Half of the participants were told that the speaker was from 'Sheffield, Northern England', and the other were told that the speaker was from 'London, Southern England'. In contrast to previous replications of this experiment, there was no evidence that the regional labels affected listeners' responses.

Session 7.2, Paper 3 (09:30-09:45)

Use of social information in the perception of Mandarin alveolar-retroflex contrast

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Previous socioperceptual research has shown that speech perception can be affected by listeners' perceived dialect information of a speaker. While these studies have focused on vowels, the current study investigates whether similar dialect effects can be found in the perception of the Mandarin alveolar-retroflex contrast, a feature that is often used to distinguish Beijing and Taiwan Mandarin. The results show that Taiwan listeners' alveolar and retroflex identification judgments were not affected by the Taiwan/Beijing primes. On the other hand, the listeners have shown to be able to classify speakers by dialect above chance based on sentences and monosyllabic words. We discussed possible reasons for the null priming effects in relation to the indexical variation conveyed by consonants, as opposed to by vowels, and perceptual sensitivity to variants within the retroflex category. Data collection involving Beijing Man-

darin listeners is underway.

Session 7.2, Paper 4 (09:45-10:00)

Facial attractiveness facilitates voice processing

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The role of visual information in auditory processing was explored using a cross-modal priming task where listeners identified the gender of male and female voice samples after being primed with a same gender face. The faces were previously rated as either attractive or unattractive. A facilitative effect was found for female voices, but not males.

7.3: Prosodic Phrasing

Wednesday, August 12, 2015, 09:00-10:00, Alsh 2

Chair: David House

Session 7.3, Paper 1 (09:00-09:15)

Syllable duration and discourse organization at intonational phrase boundaries in Taiwan Southern Min

Wang, Sheng-Fu and Fon, Janice

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This study examined syllable duration at discourse boundaries in spontaneous speech in Taiwan Southern Min with an eight-hour monologue corpus contributed by sixteen speakers, evenly split by gender and age. In order to control for prosodic boundary type, we only examined discourse boundaries that coincided with an intonational phrase boundary followed by a pause. In addition, to tease apart the possible effect of final particles, we subset the data according to whether a boundary was marked with a final particle. Results showed a disyllabic domain for pre-boundary lengthening in the dataset without final particles and a trisyllabic domain in the dataset with final particles. In addition, overall, syllable duration at the pre-boundary position showed an inverse relationship with discourse boundary strength, especially in young speakers' speech.

Session 7.3, Paper 2 (09:15-09:30)

Prosodic phrasing in parentheticals and topics across varieties of European Portuguese

Barros, Nádia and Frota, Sónia

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This study focuses on the prosodic phrasing and intonation of utterances with parentheticals and topics in two previously unstudied varieties of European Portuguese (EP) - Porto and Évora. Our findings are compared to previous descriptions for the standard variety (SEP), and two Central-Southern varieties. The results indicate that there is no variation in EP in the prosodic phrasing of these utterances, as both parentheticals and topics form independent Intonational Phrases (IP) in all varieties. However, variation was found across varieties in the effect of constituent length on phrasing, and in strategies used to mark prosodic boundaries. Some varieties exhibit a higher sensitivity to constituent length, thus promoting the formation of compound IPs (SEP, Central-Southern varieties), than others (Northern varieties). These results, together with the fact that the IP

was consistently found to be the domain for sandhi phenomena, further support the critical role of the IP in EP prosodic phonology.

Session 7.3, Paper 3 (09:30-09:45)

Prosodic phrasing and F0 in Singapore English

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A number of studies have investigated the phonetic properties of intonation patterns in Singapore English (SE). Additionally, it has been proposed that SE intonation is structured by a level of phonological phrasing above the word called the Accentual Phrase (AP), which encompasses a content word and preceding function words. This study investigates experimentally whether there are any durational correlates of AP boundaries and explores their possible relationship to established F0 patterns. In addition, the sensitivity of F0 movements to lexical stress within an AP is examined. Our findings show that word-final syllables at an AP boundary are marked by longer vowel durations than those in a phrase-medial word, and that this difference corresponds closely with known F0 correlates. Finally, within an AP, stress in a word-initial syllable results in an overall raising of F0 across the entire phrase, although the actual slopes of the contours do not differ.

Session 7.3, Paper 4 (09:45-10:00)

Post-focus pitch register lowering as a phrasal marker - An acoustic study of focus and phrasing in Shanghai Chinese

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This paper reports an experiment designed to investigate whether post-focus tonal realization is constrained by prosodic structure in Shanghai Chinese (SH). Previous studies have shown that in SH, focus expanded the f0 range of bi-syllabic tone sandhi words while pitch register lowering, instead of pitch range compression, was consistently found on post-focus bi-syllabic tone sandhi words. The present study examined durational adjustments and f0 realizations of bi-syllabic tone sandhi words at different prosodic levels under different focus conditions. The results showed that focus expanded the pitch range of the target syllables at both the levels of Prosodic Word and Major Word, but post-focus pitch register lowering was only found at the level of Major Word. Based on the results, this study concludes that post-focus tonal realization in SH is constrained by prosodic structure and post-focus pitch register lowering is a phrasal marker.

7.4: Bilingualism

Wednesday, August 12, 2015, 09:00-10:00, Carron 1

Chair: Zuzana Elliott

Session 7.4, Paper 1 (09:00-09:15)

Cross-linguistic interaction between two voiced fricatives in Mandarin-Min simultaneous bilinguals

Chuang, Yu-Ying; Wang, Sheng-Fu and Fon, Janice

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This study investigated cross-linguistic interaction in Mandarin-Min simultaneous bilinguals by examining how speech contexts and realizations of Min /z/, which is undergoing a /z/->[l] sound change, affected the realizations of Mandarin /z/. Twenty Mandarin-Min bilinguals produced /z/ words in different contexts and were grouped according to their realizations of Min /z/. Results showed speakers of Min /z/->[l] dialect had fewer retroflex variants of /z/. Read speech induced more retroflex variants of /z/ in males, but brought about a mixed effect among females. Females of Min /z/->[z] dialect had more [l], while those of the /z/->[l] dialect had more [z], implying that females used [±frication] to differentiate different speech contexts. This study thus demonstrated a dynamic context-dependent relationship between the two languages in Mandarin-Min bilinguals.

Session 7.4, Paper 2 (09:15-09:30)

Voice onset time in bilingual Greek-German children

Chionidou, Anastasia and Nicolaïdis, Katerina

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The independence or interaction between the L1 and L2 phonetic/phonological systems in bilingualism has been a challenging question. This study aims to add to previous literature by investigating voice onset time (VOT) of word initial /p, t, k, b, d, g/ by Greek-German bilingual children. A key factor also examined is the influence of language exposure on VOT variation. Twelve bilingual children living in Germany and attending different schools (Greek and German) and 12 monolingual children for each language were recorded. The results provide evidence of monolingual-like productions and of transfer of voicing features for both voiceless and voiced stops suggesting the presence of two phonetic/phonological systems that interact. Greater exposure to a language in a particular school context can lead to monolingual-like production while less exposure relates to cross-language interference with transfer of voicing features.

Session 7.4, Paper 3 (09:30-09:45)

Phonological development in the home language among early Polish-English bilinguals

Marecka, Marta; Wrembel, Magdalena and Otwinowska-Kasztelanic, Agnieszka

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The study involved the analysis of Polish speech samples of 59 Polish-English bilingual children of Polish immigrants to the UK. It aimed to explore differences in phonological performance between these early bilinguals and their Polish monolingual peers. The data collection procedure involved a sentence repetition task. 14 preselected sentences from this task were subsequently analysed auditorily by three phonetically trained raters. The measures of phonological performance included the number of speech errors made by children, and the assessment of cross-linguistic influence (CLI) in twelve areas (i.e. aspects of speech). Significant differences were found between the phonological performance measures of Polish-English bilinguals vs. 24 Polish monolingual controls. Bilinguals' speech was characterised by CLI from English, especially in the production of consonants and consonant clusters. As predicted, the phonology of the migrant Polish language in Polish-English bilingual children

was found susceptible to the influence from English, the community language.

Session 7.4, Paper 4 (09:45-10:00)

Bilingual speech rhythm: Spanish-Afrikaans in Patagonia

*Coetzee, Andries; García-Amaya, Lorenzo; Henriksen, Nicholas and Wissing, Daan
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Our study examines the extent to which Afrikaans-Spanish bilingual speakers show L1-L2 interactions in the rhythmic properties of their two languages. Eight Afrikaans-Spanish bilingual speakers who live in Patagonia, Argentina read aloud sentences in Afrikaans (their L1) and Spanish (their L2), and ten Afrikaans and eight Spanish monolingual control speakers read aloud sentences in their respective native languages. Measurements of consonantal and vocalic intervals were taken using Praat. Our results suggest that there are L2 to L1 transfer effects for vowel metrics but not for consonant metrics. We argue that this difference derives from the fact that Afrikaans phonology controls vowel duration, whereas neither Spanish nor Afrikaans uses phonemic consonant length. This shows that the extent of rhythmic influence between languages can depend on segment-specific aspects of the two phonological grammars under study.

7.5: Imitation

Wednesday, August 12, 2015, 09:00-10:00, Dochart 1

Chair: Morgan Sonderegger

Session 7.5, Paper 1 (09:00-09:15)

Effects of imitation on language attitudes associated with regional and standard accents of British English

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This study investigated whether and how imitation of sentences spoken in Liverpool English (LE) and Standard Southern British English (SSBE), affected attitudes related to these accents. LE has low prestige and low social attractiveness, while SSBE has high prestige and high attractiveness. A previous study showed that imitation positively affects social attractiveness, but not prestige, for an accent with low attractiveness and low prestige. It is unclear how imitation affects attitudes for accents with high attractiveness and high prestige. For both accents, participants repeated or imitated sentences. They gave prestige and attractiveness ratings for either accent at three points: before the experiment (baseline, before participants had heard the accent) and after each repeat/imitation session. A positive effect of imitation on attractiveness was found for LE, but not for SSBE. Also, an effect of audio exposure is reported: ratings were less stereotypical after listening to sentences spoken in the accent.

Session 7.5, Paper 2 (09:15-09:30)

Phonetic imitation is not conditioned by preservation of phonological contrast but by perceptual salience

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This study addresses disagreement between previous studies about the hypothesis that phonetic imitation does not occur if it would threaten a phonological contrast. Using a within-subject pretest-shadowing-posttest design, we tested imitability of reduction and extension of prevoicing and vowel duration in Czech, a vowel-quantity language with prevoiced-vs-unaspirated stop contrasts. Results showed imitation of extended but not of reduced prevoicing. This is compatible with the contrast-preservation hypothesis, but may also be ascribed to the lower perceptual salience of prevoicing reduction than its extension in the presence of other voicing cues. In contrast, reducing duration of a Czech long vowel is salient to native listeners. Indeed, both directions of (natural-sounding) vowel duration manipulation were imitated, even though reduction decreased the distance between phonologically long and short categories. We conclude that contrast preservation does not necessarily preclude imitation and that the likelihood of imitation of a given feature depends on its perceptual salience.

Session 7.5, Paper 3 (09:30-09:45)

The influence of metrical constraints on direct imitation across French varieties

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Recent studies have investigated phonetic and phonological direct dialect imitation in intonation, though no study has yet explored metrical convergence. In this study we therefore test the assumption that speakers of standard French can mimic the metrical properties of a Southern French variety, having a different foot structure, by inserting a schwa either in word-final or in word-medial position. In line with our hypothesis, Standard French speakers were able to produce a greater number of schwas in the Imitation phase, with the result of inserting a weak syllable. Moreover, the effect was stronger word-medially, which we explain through a phonological constraint preventing a left headed foot to appear in word-final position.

Session 7.5, Paper 4 (09:45-10:00)

Spontaneous speech imitation and cue primacy

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This study investigates the influence of cue primacy on spontaneous speech imitation by speakers of Seoul Korean. In Seoul Korean, at least two distinct acoustic cues, stop VOT and f0 of the post-stop vowel, differentiate aspirated stops from other phonation types. Previous studies have shown that English speakers imitate extended VOTs of voiceless stops both in immediate shadowing [12] and delayed imitation [11]. In this study, Seoul Korean speakers heard Korean aspirated /θ/ with either extended VOT or raised post-stop f0. The realization of these properties in their own /θ/, /t/, and /t*/ productions were compared before, during, and after exposure. After hearing /θ/s with extended VOT, participants produced these stops with higher post-stop f0 as well as longer VOT. After hearing /θ/s with raised post-stop f0, however, the same participants did not lengthen VOT but raised post-stop f0. This asymmetry is explained in terms of cue primacy in Seoul Korean.

7.6: Conversation and Listener Effects*Wednesday, August 12, 2015, 09:00-10:00, Boisdale 2**Chair: Sonja Schaeffler*

Session 7.6, Paper 1 (09:00-09:15)

Respiratory properties of backchannels in spontaneous multiparty conversation*Włodarczak, Marcin and Heldner, Mattias**włodarczak@ling.su.se*

In this paper we report on the first results of a newly started project focussing on interactional functions of breathing in spontaneous multiparty conversation. Specifically, we investigate respiratory patterns associated with backchannels (short feedback expressions), and compare them with breathing cycles observed during longer stretches of speech or while listening to interlocutor's speech. Overall, inhalations preceding backchannels were found to resemble those in quiet breathing to a large degree. The results are discussed in terms of temporal organisation and respiratory planning in these utterances.

Session 7.6, Paper 2 (09:15-09:30)

Pitch slope and end point as turn-taking clues in Swedish*Heldner, Mattias and Włodarczak, Marcin**heldner@ling.su.se*

This paper examines the relevance of parameters related to slope and end-point of pitch segments for indicating turn-taking intentions in Swedish. Perceptually motivated stylization in Prosogram was used to characterize the last pitch segment in talkspurts involved in floor-keeping and turn-yielding events. The results suggest a limited contribution of pitch pattern direction and position of its endpoint in the speaker's pitch range to signaling turn-taking intentions in Swedish.

Session 7.6, Paper 3 (09:30-09:45)

How does foreigner-directed speech differ from other forms of listener-directed clear speaking styles?*Hazan, Valerie; Uther, Maria and Granlund, Sonia**v.hazan@ucl.ac.uk*

Forty talkers participated in problem-solving tasks with another talker in conditions differing in communication difficulty for the interlocutor. A linguistic barrier condition (L2 interlocutor) was compared to acoustic barrier conditions (native interlocutors hearing vocoded or noisy speech). Talkers made acoustic-phonetic enhancements in all barrier conditions compared to the no-barrier condition, but talkers reduced their articulation rate less and showed less increase in vowel hyperarticulation in foreigner-directed speech than in the acoustic barrier condition, even though communicative difficulty was greater in the L2 condition. Foreigner-directed speech was also perceived as less clear. This suggests that acoustic enhancements in clear speech are not simply a function of the level of communication difficulty.

Session 7.6, Paper 4 (09:45-10:00)

Do children enhance phonetic contrasts in speech di-**rected to a hearing-impaired peer?***Granlund, Sonia; Hazan, Valerie and Mahon, Merle**s.granlund@ucl.ac.uk*

This study examines whether normal-hearing (NH) children enhance phonetic contrasts when speaking to a hearing-impaired (HI) peer. A problem-solving 'Grid' task was developed to elicit frequent repetitions of /p/-/b/, /s/-/ʃ/ and /i/-/ɪ/ segmental contrasts and point vowels in communicative spontaneous speech. Eighteen NH children between 9 and 15 years old performed the task once with a NH friend and once with a HI friend. Both category means and within-speaker variability were analysed. Results suggest that although HI interlocutors are likely to find the phonetic contrasts difficult to produce and perceive, children's HI-directed speech contains little evidence of phonetic category enhancement.

7.7: L2 Training and Feedback*Wednesday, August 12, 2015, 09:00-10:06, Carron 2**Chair: Ann Bradlow*

Session 7.7, Paper 1 (09:00-09:15)

Comparing the efficiency of vowel production training in immersion and non-immersion settings for Arabic learners of English*Alshangiti, Wafaa and Evans, Bronwen G.**w.alshangiti@ucl.ac.uk*

Previous research in second language (L2) learning has shown that learners benefit greatly from focused training in their L2 (e.g., [5, 9]). The current study investigated whether or not the results of production training might differ according to learning environment, specifically whether or not learners in a non-immersion setting who have fewer opportunities to interact with native speakers might benefit differently from learners in an immersion setting. Two groups of Arabic learners of English, one in London, and one in Saudi Arabia completed 5 sessions of vowel production training. A battery of pre- and post-tests tested for potential improvements in speech production and perception. Results indicated that learning environment affected learning outcomes; learners in the non-immersion environment improved in both perception and production, while learners in an immersion setting improved predominantly in production.

Session 7.7, Paper 2 (09:15-09:30)

French /y/-/u/ contrast in Japanese learners with / without ultrasound feedback: Vowels, non-words and words*Pillot-Loiseau, Claire; Kamiyama, Takeki and Kocjančič Antolik, Tanja**claire.pillot@univ-paris3.fr*

This study investigated French /y/ and /u/ produced by one native speaker (NS) and seven Japanese-speaking learners; four of them received lessons on /u/ with ultrasound visual feedback of the tongue shape and position. Acoustic measurements of 10 repetitions of six words (coronal context)

are compared to those of isolated /y/ and /u/, and of the non-words /tyt/ and /tutu/, both before and after the ultrasound lessons, in terms of i) Euclidean distance (ED) between /y/-/u/; ii) the distance F2-F3 of /y/; and iii) the distance F1-F2 of /u/. The isolated vowels were closest to NS's, followed by monosyllabic words, disyllabic ones, and then non-words. The values of all learners are significantly different from NS's at the first recording, but those of the learners having received ultrasound lessons approached NS's after the lessons.

Session 7.7, Paper 3 (09:30-09:45)

SpeakGreek: An online speech training tool for L2 pedagogy and clinical intervention

*Nicolaidis, Katerina; Papanikolaou, George; Kainada, Evia and Avelidis, Konstantinos
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This paper presents the first online biofeedback speech training tool for Greek designed to offer training on the production and perception of segmental and suprasegmental aspects of Greek. It is addressed to learners of Greek as an L2 and to clinical populations with articulation and phonation problems. The tool comprises four components: (i) the Phonetic Library, i.e. the acoustic, articulatory and visual description of different pronunciation aspects, (ii) the Basic Training, which trains users on phonation, pitch and intensity manipulation, (iii) the Sound Trainer, and (iv) the Melody Trainer, with perception and production exercises on sounds, stress and intonation. All components of production include real-time biofeedback. Initial results from L2 learners of Greek using two of the tool's components show improvement on production of the intonation of wh-questions and on consonant identification.

Session 7.7, Paper 4 (09:45-10:00)

Phonetic imitation of VOT in L2 English: Variation as a function of model talker

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The study focused on phonetic imitation in the speech of Polish learners of English, who were exposed to two pronunciation varieties: Polish-accented English and native English. The phonetic variables under investigation were voicing lag values in word-initial /p k/ and voicing lead values in word-initial /b g/. The stimuli were monosyllabic English words provided by two model talkers: a native speaker of English and a native speaker of Polish. It was found that the magnitude of phonetic imitation differed as a function of model talker. The results suggest that L2 phonetic imitation may be affected by attitudinal factors and the stage of acquisition of a given pronunciation feature.

7.8: Rhythm, Stress, and Voice Onset Time

Wednesday, August 12, 2015, 09:00-10:00, Dochart 2

Chair: Donna Erickson

Session 7.8, Paper 1 (09:00-09:15)

Voice onset time in Spanish-English spontaneous code-

switching

*Piccinini, Page and Arvaniti, Amalia
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Research on the phonetics of code-switching has focused on voice onset time (VOT) and has yielded mixed results regarding cross-language interaction, possibly due to differences in data used (scripted vs. spontaneous speech) and populations examined (L1 vs. L2 dominant, early vs. late bilinguals). Here VOT was measured in a corpus of spontaneous code-switching speech elicited from a homogeneous group of early bilinguals in conversation with and without distraction (completion of jigsaw puzzles). The distraction meant to increase cognitive load, a manipulation that could affect phonetic realization. Both English and Spanish VOT were shorter at code-switching points than in comparable monolingual utterances. English VOT lengthened overall under increased cognitive load (but remained shorter in code-switching contexts). These results support previous findings of VOT shortening in code-switching for both English and Spanish, and confirm that the effect applies in the natural speech of early bilinguals.

Session 7.8, Paper 2 (09:15-09:30)

Rhythm class perception by expert phoneticians

*Rathcke, Tamara and Smith, Rachel
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This paper contributes to the recent debate in linguistic-phonetic rhythm research dominated by the idea of a perceptual dichotomy involving "syllable-timed" and "stress-timed" rhythm classes. Some previous studies have shown that it is difficult both to find reliable acoustic correlates of these classes and also to obtain reliable perceptual data for their support. In an experiment, we asked 12 British English phoneticians to classify the rhythm class of 36 samples spoken by 24 talkers in six dialects of British English. Expert listeners' perception was shown to be guided by two factors: (1) the assumed rhythm class affiliation of a particular dialect and (2) one acoustic cue related to the prosodic hierarchy, namely the degree of accentual lengthening. We argue that the rhythm class hypothesis has reached its limits in informing empirical enquiry into linguistic rhythm, and new research avenues are needed to understand this multi-layered phenomenon.

Session 7.8, Paper 3 (09:30-09:45)

What do regression analyses of inter-stress interval duration really measure?

*Windmann, Andreas; Šimko, Juraj and Wagner, Petra
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Language-specific differences in inter-stress interval duration expressed as a function of the number of component syllables have been taken as evidence for oscillatory mechanisms in speech timing. Using corpus data and computer simulations, we provide support for the alternative hypothesis that cross-linguistic differences in the distribution of stressed syllables relative to word boundaries may account for the observed effect.

Session 7.8, Paper 4 (09:45-10:00)

The role of stress in syllable monitoring

Arvaniti, Amalia and Rathcke, Tamara

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In a syllable monitoring experiment, Greek and English speakers ($N = 20$ per language) monitored for [ma] embedded in Greek real and nonce words; [ma] was word-initial, word-medial or word-final, and stressed, unstressed or rhythmically stressed. Both groups spotted stressed [ma] faster than unstressed [ma]; unstressed [ma] was spotted faster by Greek than English participants. Rhythmically stressed [ma] patterned with unstressed [ma] for both groups. Word category (real or nonce) did not affect latencies. These results show that stress played an important role whether participants were responding to unfamiliar (nonce) stimuli (Greeks) or processing in an altogether unfamiliar language with different stress requirements (English). The importance of stress did not depend on rhythm class, as has sometimes been argued, though familiarity with language did affect responses. The results do not support the view that processing is related to rhythm class and confirm that Greek makes only a binary stress distinction.

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The study investigates the effect of stress on English word recognition by speakers of lexical tone and lexical pitch accent languages. Two on-line tasks that involved Taiwan Mandarin and Japanese speakers as test subjects and English natives as controls were conducted: (i) a uni-modal lexical decision task and (ii) a cross-modal priming and lexical decision task. It was found that Mandarin and Japanese speakers were accurate in auditorily discerning words and non-words based on stress patterns (e.g., PEOples vs. *peoPLE) insofar as the stressed syllable bore a high tone. This suggests that their representation of stress may be tonal in nature. Besides, Mandarin speakers responded faster when hearing a prime with primary stress and seeing a word with the first syllable stressed. The same was not found in Japanese speakers, suggesting that the use of stress in English word recognition was constrained by native lexical prosody.

Session 8.1, Paper 3 (12:00-12:15)

Syllable structure affects second-language spoken word recognition and production

*Martínez-García, María Teresa and Tremblay, Annie
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In this study, we show that second-language (L2) spoken-word recognition is greatly influenced by syllable-structure differences between the native language (L1) and the second language (L2), and that L2 word-recognition accuracy is a reliable predictor of L2 word-production accuracy. Spanish-speaking English learners (experimental group) completed a listening task in which they monitored /ə/s+Consonant/-initial (henceforth, /ə)sC/-initial) words in English. Proficiency-matched German-speaking English learners (L2 control group) and native English listeners (L1 control group) completed the same word-monitoring task. The Spanish group also produced the corresponding /ə)sC/-initial words. The results show a clear effect of L1 on L2 learners' word recognition, with the German group outperforming the Spanish group. For Spanish speakers, a significant positive relationship between word recognition and word production was also observed. These results indicate that L1-L2 syllable-structure differences have pervasive consequences for spoken-word recognition, and L2 word production difficulties may be closely tied to L2 word recognition difficulties.

Session 8.1, Paper 4 (12:15-12:30)

Rate-dependent speech processing can be speech-specific: Evidence from the disappearance of words under changes in context speech rate

*Dilley, Laura; Pitt, Mark; Szostak, Christine and Baese-Berk, Melissa
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Function words in casual speech can be made to disappear by slowing the surrounding speech rate [1]. The current study explored the domain generality of this disappearing word effect, asking whether function words can be made to disappear by manipulating temporal properties of non-speech context. Stimuli were short word sequences (e.g. minor or child) appended to precursors that were either speech, low-pass filtered speech, or tone sequences, presented at a spoken rate and a slowed rate. Across two exper-

ORAL SESSION 8

8.1: Word Recognition

Wednesday, August 12, 2015, 11:30-12:30, Alsh 1

Chair: Mirjam Ernestus

Session 8.1, Paper 1 (11:30-11:45)

Speaker identity and spectral influences on word recognition

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Listeners are quicker responding to a word the second time it is heard, but this effect is reduced when the word is repeated by a different speaker. Is this reduction related to the auditory dissimilarity between different voices, or does it result from top-down effects associated with perceived speaker changes? To investigate this, listeners were presented with words differing in their pitch and/or apparent vocal-tract length, and performed a lexical-decision task where words were repeated at different delays between repetitions. Listeners also performed a voice-difference rating task using the same words and voices. At short delays, response-time patterns are better explained by perceived speaker-changes than by auditory dissimilarity. However, at longer delays between repetitions, response times are only affected by spectral mismatches. Results suggest that perceived speaker changes may influence the use of acoustic cues in word recognition, but only in the immediate vicinity of a perceived speaker change.

Session 8.1, Paper 2 (11:45-12:00)

The effect of stress on English word recognition by native speakers of typologically different languages

Ou, Shu-chen and Guo, Zhe-chen

iments, only precursors heard as intelligible speech generated a speech-rate effect (i.e. reporting fewer function words in a slowed vs. normal-rate context), suggesting that rate-dependent speech processing can be domain-specific.

8.2: Conversation Tasks

Wednesday, August 12, 2015, 11:30-12:30, Carron 1

Chair: Jelena Krivokapić

Session 8.2, Paper 1 (11:30-11:45)

Absolute and relative entrainment in Mandarin conversations

Ma, Qiuwu; Xia, Zhihua and Wang, Ting

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Based on Tongji Games Corpus, this study analyzes acoustic-prosodic entrainment in Mandarin conversations. Analyses have been accomplished at the levels of conversation, turn, and tone unit. Absolute entrainment in prosody is found at the levels of conversation and turn, and relative entrainment is found over tones. Therefore, this study identifies evidence for the existence of two kinds of entrainment in Mandarin conversations.

Session 8.2, Paper 2 (11:45-12:00)

A study of prosodic alignment in interlingual map-task dialogues

Akira, Hayakawa; Cerrato, Loredana; Campbell, Nick and Luz, Saturnino

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This paper reports results from a study of how speakers adjust their speaking style in relation to errors from Automatic Speech Recognition (ASR), while performing an Interlingual map task. The dialogues we analysed were collected using a prototype speech-to-speech translation system which adds 3 elements to the communication which we think of as "filters": Automatic Speech Recognition (ASR), Machine Translation (MT) and Text To Speech (TTS). Our belief is that these filters affect the speakers' performance in terms of cognitive load, resulting in adaptation of their communicative behaviour. The study shows that the participants do adjust their speaking style and speaking rate as a way of adapting to the errors made by the system. Specifically, the results show that (a) system errors influence speaking rate, and (b) the perceived level of cooperation by the interlocutors increases as system error increases.

Session 8.2, Paper 3 (12:00-12:15)

Eliciting the Dutch loan phoneme /g/ with the menu task

Hamann, Silke and de Jonge, Alma

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This article introduces the menu task, which can be used to elicit infrequent sounds such as loan phonemes that only occur in a restricted set of words. The menu task is similar to the well-known map task and involves the interaction of two participants to create a menu on the basis of a list of words (all referring to food). This new task was used to obtain realizations of loanwords with a voiced velar plosive

/g/ by an older and a younger group of native speakers of Dutch, which lacks this phoneme. Results show that all participants were fairly consistent in their pronunciations per word. However, the younger group had word-specific realizations: they employed a voiceless uvular fricative [χ] in spaghetti and a voiced velar stop [g] in gorgonzola, while the older group used a voiced or voiceless plosive in both words. These findings indicate a lexically diffusing sound change in the adaptation of /g/ into Dutch.

8.3: Chinese Learners of English

Wednesday, August 12, 2015, 11:30-12:30, Dochart 1

Chair: David Deterding

Session 8.3, Paper 1 (11:30-11:45)

Post-focus compression in English by Mandarin learners

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This study examines the phonetic realization of focus in L2 English by L1 Beijing Mandarin learners for insight into the effect of language experience on the acquisition of L2 prosody. Compared to American speakers' production, experienced Beijing Mandarin learners of English were able to produce native-like duration change and in-focus expansion of intensity but not in-focus expansion of F0 and post-focus compression (PFC) of F0 and intensity in English. These results confirm the previous finding that PFC does not easily transfer from one language to another [4, 19, 21]. However, the Chinese college seniors, who had been residing in the US longer, produced more PFC in English than the Chinese college freshmen in the current study, suggesting PFC can be learned given sufficient L2 experience.

Session 8.3, Paper 2 (11:45-12:00)

Where does interlanguage speech intelligibility benefit come from: Shared phonological knowledge or exposure to accented speech

Li, Guo and Mok, Peggy Pik Ki

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Previous studies in interlanguage speech intelligibility benefit (ISIB) did not separate the effects of shared knowledge of L1 in non-native talkers from those of listeners through extensive exposure to accented L2 speech, which is crucial to the mechanism underlying ISIB. This preliminary study attempts to tease apart the two by comparing perception accuracy of Mandarin-accented English words among Mandarin listeners, English listeners who have not learned Mandarin, and learners of Mandarin who had varied amount of exposure to Mandarin-accented English. Consistent with previous studies, Mandarin listeners showed the highest accuracy. For word pairs contrasting voiceless and voiced velar stops in coda position, learners of Mandarin who had greater exposure to Mandarin-accented English showed higher accuracy than learners who had less exposure. These results support ISIB for Mandarin and suggest that ISIB is more likely to stem from exposure to accented L2 speech than from shared knowledge alone.

Session 8.3, Paper 3 (12:00-12:15)

Increasing context: L2 production of English intonation by L1 Mandarin and L1 Spanish speakers

Colantoni, Laura; Klassen, Gabrielle; Patience, Matthew; Radu, Malina and Tararova, Olga

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One of the uncontested linguistic uses of intonation is the marking of sentence-type. Intonation, however, can be a redundant cue to sentence type, as in English statements or absolute yes-no questions, or the only cue, as in declarative questions. We explore the realization of sentence prosody by advanced Spanish and Mandarin learners of English. Since the target-like realization of sentence prosody involves the acquisition of phonetic and semantic properties, we compared the production of statements, absolute questions and declarative questions of the experimental groups using an elicited imitation task and a contextual sentence production task that differed in the amount of contextual information provided. Both tasks yielded different patterns of cross-linguistic influence. In the elicited imitation task, differences were restricted to the phonetic realization of pitch accents. In the second task, syntactic (merger of two questions) and phonetic differences (pitch excursion size) emerged.

Session 8.3, Paper 4 (12:15-12:30)

Comparing L1's effects on English coda obstruent perception: Mandarin and Korean identification performance

de Jong, Kenneth and Hao, Yen-Chen

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This study investigates the perceptual confusion of English obstruents in the coda position by Mandarin and Korean-speaking L2 learners. The two languages differ in that Mandarin does not allow obstruent codas, while Korean neutralizes underlying laryngeal and manner contrasts into voiceless stop codas. The stimuli are eight English obstruents /p b t d f v θ ð/ combined with the vowel /a/. 41 Mandarin and 40 Korean speakers participated in an identification task. The results show that the Mandarin speakers generally achieved higher accuracy than the Koreans. The errors are further analysed based on their voicing, manner, and place confusions. Both groups exhibited a bias toward voiceless consonants, fricatives, and labial responses. The similarity of the two L1 groups suggests a strong and pervasive language-independent tendency in speech perception.

8.4: Vowel Perception

Wednesday, August 12, 2015, 11:30-12:30, Alsh 2

Chair: John Kingston

Session 8.4, Paper 1 (11:30-11:45)

Asymmetries in vowel perception: Effects of formant convergence and category "goodness"

Masapollo, Matthew; Polka, Linda and Ménard, Lucie
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The mechanisms underlying directional asymmetries in

vowel perception are a focus of debate. One account – the Natural Referent Vowel (NRV) framework – suggests that asymmetries reflect a language-universal phonetic bias, such that listeners are predisposed to attend to vowels with extreme articulatory postures, which display high formant convergence. A second account – the Native Language Magnet (NLM) theory – suggests that asymmetries reflect a language-specific bias favoring “good” exemplars of native vowel categories. We examined whether listeners display asymmetries influenced by formant proximity and/or language experience. Specifically, we tested English adults in a same-different discrimination task, using /u/ vowels that systematically differed in their degree of formant proximity (between F1 and F2) and stimulus goodness. Results revealed asymmetries as predicted by NRV when vowel pairs exhibited a relatively larger difference in their F1-F2 convergence patterns, and as predicted by NLM when vowel pairs exhibited a relatively smaller difference in their F1-F2 convergence patterns.

Session 8.4, Paper 2 (11:45-12:00)

Vowel perception by listeners from different English dialects

Karpinska, Marzena; Uchida, Shodai and Grenon, Izabelle
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Native English listeners from North America rely primarily on changes in formants, not vowel duration, when perceiving the vowel contrast in the minimal pair bit and beat manipulated from a Canadian English sample [5]. In this paper, we evaluated which cue do native English listeners from other regions use when perceiving the same North American vowel contrast. For this purpose, we used the same task and stimuli as in the study with North American listeners. Our results indicate that listeners from the UK, New Zealand, Ireland and Singapore used primarily changes in formants, a pattern similar to listeners from North America. Australian listeners, however, relied primarily on vowel duration rather than formants. The reaction time results suggest that the difference between Australian listeners and other listeners may be due to differences in the characteristics of vowels in Australian English versus North American English.

Session 8.4, Paper 3 (12:00-12:15)

Perceptual asymmetry between greater and lesser vowel nasality and VOT

Nielsen, Kuniko and Scarborough, Rebecca
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This study explores whether there is an asymmetry with respect to the perceptual salience of an increase vs. a decrease of phonologically relevant features. A forced-choice discrimination experiment was conducted on stimulus pairs that included one member with unchanged phonetic features and the other with either increased or decreased degree of features (i.e. vowel nasality or VOT). The results revealed a perceptual asymmetry: participants were more accurate and in some cases faster in their responses to stimulus-pairs containing increased-feature stimuli, suggesting that greater presence of these phonetic features is perceptually more salient than decreased presence. These findings demonstrate sub-categorical sensitivity for features known to be

perceived categorically (VOT), as well as for features not primary to phonological contrast (vowel nasality). They also support a possible salience explanation for previously observed asymmetries in phonetic imitation.

8.5: Phonetics of Emotion

Wednesday, August 12, 2015, 11:30-12:30, Boisdale 1

Chair: Richard Ogden

Session 8.5, Paper 1 (11:30-11:45)

Acoustic-phonetic properties of smiling revised – Measurements on a natural video corpus

Barthel, Helen and Quené, Hugo

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Smiling while talking can be perceived not only visually but also audibly. Several acoustic-phonetic properties have been found to cue smiling in the acoustic signal. The aim of this study was to validate properties associated with smiled speech using a natural video corpus. The realisations of monophthongs of the same words spoken with and without a visible smile were compared. The results show a significant increase of intensity (for all words), of F2 (for words with the round vowel /o:/) and of F0 (for all words except the backchannel marker ja) in the smiled condition.

Session 8.5, Paper 2 (11:45-12:00)

The connection between smiling and GOAT fronting: Embodied affect in sociophonetic variation

Podesva, Robert; Callier, Patrick; Voigt, Rob and Jurafsky, Dan
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This study examines the effect of smiling on GOAT fronting, a sound change common to many varieties of American English. The data are audiovisual recordings of ten speakers of American English recorded in dyadic conversations in an interactional sociophonetics laboratory. We applied an existing computer vision algorithm for smile detection to the video recordings to identify smiling intervals. A mixed-effects linear regression reveals that higher F2 (i.e. auditorily fronter GOAT) positively correlates with whether speakers are smiling while articulating the vowel and their self-reported comfort levels in the interaction. The latter factor does not correlate with whether vowels were smiled. Together, the findings suggest that GOAT fronting is not only a phonetic consequence of smiling, but also serves an affective, interactional function. While sociophonetic studies typically analyze audio recordings alone, patterns of variation are better explained by also attending to embodied practices observable only in the visual domain.

Session 8.5, Paper 3 (12:00-12:15)

The voice of love

Belanger, Trisha; Menezes, Caroline; Barba, Claire; Helo, Mofida and Shirazifard, Kimia

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The present study is a phonetic analysis of the emotions of love. We focus on the voicing differentiation of romantic love, parental-child love, friendship (love for a friend), and patriotism. Open quotient, spectral tilt, formant frequencies

and amplitudes were extracted from a target word spoken by male and female college students as they provided the voice over for selected video clips. Results reveal gender differences for open quotient and fundamental frequency. However, none of the voice source parameters were clearly able to differentiate the different forms of love.

8.6: Phonetics of Singing

Wednesday, August 12, 2015, 11:30-12:30, Carron 2

Chair: Volker Dellwo

Session 8.6, Paper 1 (11:30-11:45)

Vowel and consonant identification at high pitch: The acoustics of soprano unintelligibility

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Sopranos are notoriously difficult to understand. This study tracks the progressive loss with extreme high f0 of (a) vowel quality distinctions, and (b) the percept of a syllable-initial lateral. A soprano sang [IV] syllables on the notes of an arpeggio from A4 to A5. V ranged over [i, ε, a, ə, u, əə]. She performed as a phonetician, not a trained singer, so that aesthetic adjustments of vowel configuration were avoided to isolate the effect of f0. Twenty-seven students with IPA training responded on a forced-choice vowel quadrilateral, reporting also whether [l] was present. At the highest f0, all vowels sounded open and lateral detection was erratic. Findings are discussed with reference to acoustic analysis. Loss of spectral peak definition is argued to explain the results, but at intermediate pitches there is some recoverability of vowel articulation thanks to differing relative amplitudes in the first three harmonics.

Session 8.6, Paper 2 (11:45-12:00)

Speech perception at its best: Extracting linguistic information from acoustically underspecified input. The case of singing

Deme, Andrea

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High-pitched sung vowels are “underspecified” due to i) the tuning of the F1 to the f0 accompanying pitch-raising, and ii) the wide harmonic spacing of the voice source resulting in the undersampling of the vocal tract transfer function. Therefore, sung vowel intelligibility is expected to decrease as the f0 increases. On the basis of the literature of speech perception it is often suggested that sung vowels are better perceived if uttered in CVC context (than in isolation) even at high f0, but the results for singing are contradictory. In the present study we further investigate this question. We compare vowel identification in sense and nonsense CVC sequences and show that the positive effect of the context disappears if the number of legal choices is similar in both conditions, meaning that any positive effect of the CVC context may only stem from the smaller number of possible responses, i.e. higher probabilities.

Session 8.6, Paper 3 (12:00-12:15)

Intelligibility of sung words in polytextual settings

Hawkins, Sarah; Honey, Kate; Knight, Sarah and Heinrich, An-tje
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Three experiments used word-spotting to examine influences of phonetic and musical parameters on intelligibility of closed-set but unpredictable words in polytextual singing. Main comparisons were: 3 musical genres (medieval polyphonic motet, similar but homophonic motet, jingle); harmony (consonant, dissonant); keyword phonetic properties ('acoustic contrast', vowel length, vowel quality); contrast between keyword and competitor word (Onset, Vowel, Coda). Results showed strong effects of phonetic and musical parameters that affect pitch continuity and rhythm. Vowel quality affected responses but with no discernibly consistent pattern.

8.7: Prosodic Boundaries

Wednesday, August 12, 2015, 11:30-12:30, Boisdale 2

Chair: Taehong Cho

Session 8.7, Paper 1 (11:30-11:45)

Boundary tones in Spanish declaratives: Modelling sustained pitch

*Estebas-Vilaplana, Eva; Gutiérrez, Yurena M.; Vizcaíno, Francisco and Cabrera, Mercedes
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The aim of this paper is to present a phonological description of the boundary tones in final and non-final declarative sentences in Spanish, drawn from a read news corpus and a dialogue corpus. The final clauses tend to finish with L*L% and sometimes L+H*L%. Four different pitch configurations can be found for non-final patterns: a rise (L*H%), a fall-to-mid (H*!H%), a fall-rise (H*LH%) and a sustained tone, which presents different phonetic manifestations depending on the pitch level of the previous accent (H*, !H* or L*). These findings question the validity of the traditional Sp_ToBI convention (HL%) to describe a sustained tone since it cannot account for a level pitch after !H* or L*. A new boundary tone, =%, is proposed whose feature for pitch height is underspecified. For this reason, it can adopt the values of H, !H or L, according to the pitch height of the last accent

Session 8.7, Paper 2 (11:45-12:00)

The perception of boundary tones in infancy

*Sundara, Megha; Molnar, Monika and Frota, Sónia
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We investigated English-learning 4-month-olds' ability to discriminate a final rise versus fall in pitch that distinguishes questions from statements in Portuguese and English. Using visual habituation, we showed that English-learning 4-month-olds failed to categorize segmentally varied Portuguese statements vs. questions. They only succeeded when tested with restricted segmental variability in a more sensitive procedure. Finally, we showed that Basque-learning 4-month-olds have no difficulty categorizing Portuguese statements and questions.

Session 8.7, Paper 3 (12:00-12:15)

Prosodic boundaries in Lombard speech
*Beňuš, Štefan and Šimko, Juraj
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Communicative intentions in realizing prosodic boundaries and in making speech more intelligible to the listener in ambient noise both utilize variation in F0 and duration. This paper asks how these cues relate when boundary type and the level of noise is varied. Two durational and two F0 measures of boundary strength extracted in the vicinity of boundaries are analyzed. Data suggest relatively weak local hyper-articulation, both cumulative and compensatory relationships between the cues, and subject-specific complementary strategies for cue selection in signalling communicative intentions.

Session 8.7, Paper 4 (12:15-12:30)

Exploring acoustic and syntactic cues to prosodic boundaries in French: A multi-genre corpus study
*Christodoulides, George and Simon, Anne Catherine
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This paper investigates the way prosody and syntactic structure combine in the perception of prosodic boundaries in French. Based on a 3.5-hour balanced corpus, we first analyse the distribution of boundary types across genres, and then examine the acoustic correlates of prosodic boundaries and their relationship to linguistic features (part-of-speech categories and syntactic clauses).

8.8: Clinical Phonetics: Articulation

Wednesday, August 12, 2015, 11:30-12:30, Dochart 2

Chair: Claire Timmins

Session 8.8, Paper 1 (11:30-11:45)

Has a split tongue one or two tongue tips during articulation?

*Tomaschek, Fabian
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Towards the end of the 1990s a new trend in the culture of body modification arose: tongue splitting. The result of this body modification is a tongue tip split into two parts. The present paper reports a single-case study of articulation by a subject who underwent tongue bifurcation. We find that movement direction and the tongue's acceleration/deceleration behavior affected the degree of displacement of the right tongue tip relative to the left tongue tip. Potential explanations are discussed.

Session 8.8, Paper 2 (11:45-12:00)

Articulation therapy for children with cleft palate using visual articulatory models and ultrasound biofeedback
*Roxburgh, Zoe; Scobbie, James M. and Cleland, Joanne
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Visual biofeedback tools, such as Electropalatography (EPG), are recommended for assessing and treating speech sound disorders (SSDs) associated with Cleft Palate (CP). However, EPG is not suitable for all clients, due to dependencies on

stable dentition and timing of palatal repair. Ultrasound is becoming increasingly popular for its use in treating SSDs, with no reports on its dependency on structure of the vocal tract. However its clinical application in the CP population remains to be tested. We compared Visual Articulatory Models (VAMs) with Ultrasound for the treatment of SSDs in two children with repaired submucous CP. Both children received two blocks of therapy each with eight sessions, with the first block using VAMs and the second using ultrasound. Results showed that both children improved overall, with more improvement found in the first block of therapy using VAMs.

Session 8.8, Paper 3 (12:00-12:15)

Effects of cosmetic tongue bifurcation on English fricative production

Budd, Alyson; Schellenberg, Murray and Gick, Bryan
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Differences in the speech of individuals with cosmetically bifurcated tongues have yet to be extensively investigated. The aim of this study was to collect acoustic and ultrasound data so as to provide preliminary descriptive analysis of the production of fricative consonants by several speakers of this population. Results indicate that the fricatives of bifurcants were judged as atypical by a trained listener between 13 -53% of the time, with the voiceless interdental fricative [θ] being the most consistently affected and the voiced post alveolar fricative [ʒ] being the least affected.

sive utterances, while subjects still confused large amount of submissive utterances to "neutral".

Paper P3.2 (Presenter at poster: 10:00-11:30)

Gestural prosody and the expression of emotions: A perceptual and acoustic experiment

Fontes, Mario and Madureira, Sandra
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This paper presents a perceptual and acoustic experiment and introduces methodological procedures to deal with qualitative and quantitative variables. Its objectives are: investigating the functions of vocal and facial gestures in the appraisal of six basic emotions (Anger, Distaste, Fear, Happiness, Sadness and Shame) and valence (positive, neutral and negative); discussing the interaction between the visual, vocal and semantic dimensions in the evaluation of audio, visual and audiovisual stimuli corresponding to 30 utterances (10 of them semantically positive, 10 neutral and 10 negative). The correlation among the variables was made by non-parametric tests applying FAMD and MFA. Among the perceptual and acoustic variables investigated, the most influential for the identification of valence/emotions were found to be the VPAS and the Expression Evaluator measures. Judgments concerning the positive, negative and neutral valence of the utterances and the type of emotion varied accordingly to the kind of stimuli (audio, visual or audiovisual).

Paper P3.3 (Presenter at poster: 10:00-11:30)

Auditory, visual, and auditory-visual spoken emotion recognition in young and old adults

Simonetti, Simone; Kim, Jeesun and Davis, Chris
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The study examined the recognition of emotional speech as a function of the clarity of expression, the modality of presentation, and participants' age ($M(\text{age}) = 19.8$ vs. 73.9). Based on the results of a previous study, expression clarity was varied by selecting Auditory-Visual (AV) recordings of one actor who had well recognised expressions of anger, happiness, sadness, surprise, disgust, and neutral, and one actor who did not. The young ($n = 24$) and older ($n = 19$) participants were presented these stimuli in Auditory-Only (AO), Visual-Only (VO), or AV format and made a forced-choice judgement on each. Older adults performed worse than younger ones for all presentation modalities except clear VO expressions. Importantly, whereas younger adults showed an AV benefit ($AV > VO$), older adults did not (showing a presentation mode by clarity interaction). The importance of varying signal clarity when investigating age effects was discussed.

Paper P3.4 (Presenter at poster: 10:00-11:30)

Influence of verbal content on acoustics of speech emotions

Pajupuu, Hille; Pajupuu, Jaan; Tamuri, Kairi and Altrov, Rene
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This paper deals with the issue of the influence of verbal content on listeners who have to identify or evaluate speech emotions, and whether or not the emotional aspect of verbal content should be eliminated. We compare the acoustic parameters of sentences expressing joy, anger, sadness and neutrality of two groups: (1) where the verbal content aids

POSTER SESSION 3

Phonetics of Emotion

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.1 (Presenter at poster: 10:00-11:30)

Perceptual experiment and acoustic analysis of Chinese attitudes: A preliminary study

Tang, Ping and Gu, Wentao
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The present work studied 13 types of Chinese attitudes and compared the confusion patterns between subjective and objective identification. The listening experiment showed that the overall recognition rate for these attitudinal utterances was 46% by native subjects, while in discriminant analysis, the recognition rate was 25.4% based on five prosodic parameters (minimum f0, maximum f0, mean f0, f0 standard deviation, and speaking rate). Cluster analysis of the subjective and objective confusion patterns showed some similarities between them. For example, "friendly" and "polite", "hostile" and "rude" were confused in both subjective and objective identification. However, some attitudes were prosodically similar, e.g. "neutral" and "sincere", but the subjects were able to distinguish them. On the contrary, neutral utterances were prosodically different from submis-

the listener in identifying emotions; and (2), where the verbal content does not aid the listener in identifying emotions. The results reveal few significant differences in the acoustic parameters of emotions in the two groups of sentences, and indicate that the elimination of emotional verbal content in speech presented for emotion identification or evaluation is, in most cases, not necessary.

Paper P3.5 (Presenter at poster: 10:00-11:30)

Perception of levels of emotion in prosody

Dimos, Kostis; Dellwo, Volker and Dick, Leo

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Prosody conveys information about the emotional state of the speaker. In this study we test whether listeners are able to detect different levels in the emotional state of the speaker based on prosodic features such as intonation, speech rate and intensity. We ran a perception experiment in which we ask Swiss German and Chinese listeners to recognize the intended emotions that the professional speaker produced. The results indicate that both Chinese and Swiss German listeners could identify the intended emotions. However, Swiss German listeners could detect different levels of happiness and sadness better than the Chinese listeners. This finding might show that emotional prosody does not function categorically, distinguishing only different emotions, but also indicates different degrees of the expressed emotion.

Paper P3.6 (Presenter at poster: 10:00-11:30)

Cross-language perception of emotional children's speech in German and Russian

Evgrafova, Karina; Skrelin, Pavel and Shatalova, Daria
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The paper concerns universal and language-specific aspects of emotion perception in children's speech. Three experiments were carried out to investigate differences and similarities in the assessment of emotions by German and Russian adult listeners. The corpora of German and Russian emotional children's speech were employed in the first and second experiments. In the third experiment German and Russian 'delexicalised' utterances were used. They were selected from both corpora and white noise was added, too. Thus the semantic content was removed while the prosodic features stayed intact. The experiment was aimed at analyzing recognition strategies when listeners rely only on prosody while segmental level information is not present. The experiments revealed similar and different patterns of assessing emotions in children's speech in German and Russian. The study contributes to better understanding of cross-lingual human emotion perception and the role of verbal, segmental and suprasegmental components in emotion recognition.

History of Phonetics

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.7 (Presenter at poster: 10:00-11:30)

International phonetic congresses: The shift in research

practices and areas of interest over 44 years

Šturm, Pavel

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There is no doubt that phonetics is nowadays a well established research discipline with a long history of its existence. The success of the first phonetic congress held in 1932 in Amsterdam gave rise to a regular series of creative meetings of phoneticians and speech scientists from across various disciplines, presenting an opportunity for fruitful discussion. The current paper addresses the development of phonetics from the perspective of two congresses separated by 44 years, during which time the field was substantially transformed in many respects. The data are based on the proceedings from the 6th ICPhS (Prague, 1967) and the 17th ICPhS (Hong Kong, 2011). The two congresses are compared in terms of both participants and presented papers, with a special focus on topics of the papers and methods used in experiments.

Phonetics of Second and Foreign Language Acquisition

II: Segmental Production

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.8 (Presenter at poster: 10:00-11:30)

Production of Estonian vowels by Japanese subjects

Nemoto, Rena; Meister, Einar and Meister, Lyra
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This study explores the production of Estonian vowel categories by second-language (L2) speakers of Estonian whose native language (L1) is Japanese. The Estonian vowel system includes nine vowels whereas Japanese has only five. The results by six native Japanese and ten native Estonian subjects when reading Estonian target words in sentences show that Japanese subjects were successful in the production of Estonian vowels which assimilate well to the corresponding Japanese vowels (/i/, /e/, /o/) and faced difficulties in the discrimination of vowel contrasts involving single-category assimilation (Estonian /ü/, /ö/, /õ/, /u/ to Japanese /u/).

Paper P3.9 (Presenter at poster: 10:00-11:30)

Young Russian immigrants' segmental duration and length in Finnish

Ullakonoja, Riikka and Kuronen, Mikko
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This pilot study sheds light on how young Russian immigrants (n=10) produce Finnish segmental duration and length in read-aloud speech as compared to native Finnish speakers (n=5). Segment duration is distinctive in Finnish and an important feature of Finnish phonology, whereas in Russian it only plays a marginal role. The results show a general tendency of durational contrasts being difficult to learn with great interspeaker differences.

Paper P3.10 (Presenter at poster: 10:00-11:30)

Vowel duration in English as a second language among Javanese learners

Perwitasari, Arum; Klamer, Marian; Witteman, Jurriaan and Schiller, Niels O.

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How Javanese (L1) learners of English (L2) produce durational features of vowels has received increasing interest in the study of second language acquisition because the vowel systems are very disparate. The present production experiment attempts to shed light on the interference by Javanese (L1) on English vowel production (L2). The results are discussed with respect to differences in the vowel systems of English and Javanese. It was found that speech duration of native English speakers is significantly different from Javanese learners of English. Specifically, Javanese learners of English mispronounce all English vowels, both long and short, and fail to produce target L2 vowels. The results are discussed with respect to two hypotheses of L1 interference in second language learning.

Paper P3.11 (Presenter at poster: 10:00-11:30)
Tongue movement in a second language: The case of Spanish /eɪ/-/e/ for English learners of Spanish
Darcy, Isabelle and Mora, Joan C.
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This study examines the amount of tongue movement in the productions of native Spanish speakers and native English learners of Spanish for the Spanish diphthong/monophthong contrast /eɪ//e/. We hypothesized that English learners would use their native English category /eɪ/ for both Spanish vowels. However, results show that against our prediction, for both Spanish vowels, learners produced less tongue movement than was expected if they used their L1 category. Instead, they produced both vowels as the monophthong /e/, effectively neutralizing the contrast in terms of tongue movement.

Paper P3.12 (Presenter at poster: 10:00-11:30)
An acoustic investigation of the production of English /s/ by L2 Thai learners
Kitikanan, Patchanok; Al-Tamimi, Jalal and Khattab, Ghada
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In the field of second language (L2) production, phonetic investigations of L2 fricatives are rare due to the complexity of establishing similarities and differences between L1 and L2 fricatives. The study of English /s/ production by L2 Thai learners has not received much attention, as researchers on L2 English have typically believed that learners would produce this sound with ease due to the positive influence from /s/ in their L1 Thai sound system. In this study, /s/ production in three language groups - L1 English, L1 Thai and L2 English - was acoustically compared as a function of gender and three vowel contexts. Findings showed that the acoustic characteristics of L1 Thai /s/ were different from its L1 English counterparts in many speakers and vowel contexts, and that L2 English /s/ production was different from either, suggesting that L2 Thai learners use different strategies for their /s/ production in English and Thai.

Paper P3.13 (Presenter at poster: 10:00-11:30)
L2 stressed vowel production by Bulgarian learners of German
Andreeva, Bistra; Barry, William; Pützer, Manfred and Tanchev, Alexander
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This study investigates the production of German vowels by three groups of Bulgarian speakers. Two groups have been living in Germany for approx. 5 and 10 years, respectively. The third group has not lived in Germany but has received on average 8.6 years of German tuition in Bulgaria. The acoustic analyses of quality (F1, F2) and quantity (duration in ms.) compare the Bulgarian L2 vowels both with the L1 vowels of a German control group and with the Bulgarian speakers' own L1 vowels. The results show that Bulgarian L2 speakers have difficulties in realizing several German-vowel quality contrasts and that they differ from native speakers in the degree to which they employ duration to realize these contrasts.

Paper P3.14 (Presenter at poster: 10:00-11:30)
The ultrasound study of /ɹ/ in non-native speakers
Lyskawa, Paulina
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The study examines articulatory properties of the English rhotic when produced by 5 speakers of English as a Second Language born and raised in Poland. Although Polish has a rhotic in its phonemic inventory, auditorily it is different enough for the speakers to try to approximate a non-native retroflex or bunched /ɹ/ when speaking English. The quantitative results from ultrasound imaging show an array of tongue shapes and positions when producing this foreign sound. The general tendency is to produce retroflex-like /ɹ/ regardless of sex, age, time of emigration or the type of formal instruction received in ESL classes.

Paper P3.15 (Presenter at poster: 10:00-11:30)
The production of Persian rhotics by native Mandarin speakers
Falahati, Reza
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This study investigates the non-native production of rhotics by Mandarin speakers learning Persian as L3 and it compares the results with that of native speakers. In the light of the findings, one of the predictions made by the Speech Learning Model was tested. According to this model, speech acquisition happens at a position-sensitive allophonic level. A series of informal /casual interviews were conducted to collect the data. This resulted in 1252 tokens used for the analysis. The results showed that all speakers produce the allophonic variant trill which exists in Persian but is absent in both Mandarin and English as their L1 and L2. However, their contextual distribution did not show the same pattern as the native speakers. It is suggested that extra-linguistic factors should be also taken into account in order to get a fuller picture of non-native allophonic production.

Paper P3.16 (Presenter at poster: 10:00-11:30)
The role of L1 production compactness on the L2 production accuracy
Zhi, Na; Li, Ajun and Jia, Yuan
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This study explores the role of different speakers' L1 vowel compactness on their L2 vowel production efficiency. It is found in study [4] that Spanish speakers who have more compact L1 vowel space can perform better than those "dispersed" speakers in the distinction and production of French

vowels, including both the L2 “assimilated” vowel-contrasts, ones similar to the L1 vowel categories, and the “uncategorized” L2 vowels, ones as unfamiliar and new sounds to L1 speakers. In light of [4], this paper examines the correlation between the L1 compactness variety and the L2 production accuracy with two groups of Chinese speakers, Beijing speakers and Jining-Mandarin diglossia ones. The individual speakers’ native production differences, their English vowel performance, and the relation between the two are presented in the study.

Speech Production and Articulation II: Preparation and Planning

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.17 (Presenter at poster: 10:00-11:30)

Quantifying ultrasound data from a tongue twister experiment using curve-to-curve distance

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This study examined the production of four-word tongue twisters (e.g. top cap cop tab) by six English participants using ultrasound imaging of the tongue. Onset consonant closures for /t, d, k, g/ in the contexts of /a/ and /æ/ were extracted from the video and traced using EdgeTrak software. Traces were analyzed using a mean minimum point-to-point distance measure between curves [12]. Curves were compared within allophonic group (e.g. [ka] in cop vs. [ka] in com) and across phoneme category (e.g. [ka] in cop vs. [ta] in top) to quantify similarity to the desired production and expected error. Perceived speech errors had greater within-group distance and smaller between-group distance, consistent with the production of the wrong target. Productions that deviate significantly from other productions within the group can be classified as gradient errors. By these measures both categorical errors and gradient errors were relatively rare.

Paper P3.18 (Presenter at poster: 10:00-11:30)

Articulatory speech errors and word structure

Slis, Anneke; Bali, Rohan; Namasivayam, Aravind; Chaldi, Dimitra and Van Lieshout, Pascal

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This study explores how identical final CV syllables in C1VC3V C2VC3V word pairs affect speech error patterns. Recent kinematic studies have shown that speakers frequently added non-intended movements to intended articulatory movements during the first consonants of C1VC3 C2VC3 syllables or reduce the range of the intended movements [1, 2, 3]. This effect was especially strong in syllables that contained identical final consonants, such as in switching from “cop top” to “top cop” [2]. It was hypothesized for the current study that C1VC3V C2VC3V word pairs, in which the second and fourth syllable were identical, would show similar intrusion and reduction patterns. Articulatory movements of the tongue tip, dorsum and lower lip were recorded with the 3D Electro-Magnetic Articulograph (AG501). Stimuli consisted of pairs of open and pairs of

closed syllables. The findings revealed that CVCV CVCV word pairs resulted in significant more intrusions than CVC CVC word pairs.

Paper P3.19 (Presenter at poster: 10:00-11:30)

Effect of phonetic onset on acoustic and articulatory speech reaction times studied with tongue ultrasound

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We study the effect that phonetic onset has on acoustic and articulatory reaction times. An acoustic study by Rastle et al. (2005) shows that the place and manner of the first consonant in a target affects acoustic RT. An articulatory study by Kawamoto et al. (2008) shows that the same effect is not present in articulatory reaction time of the lips. We hypothesise, therefore, that in a replication with articulatory instrumentation for the tongue, we should find the same acoustic effect, but no effect in the articulatory reaction time. As a proof of concept of articulatory measurement from ultrasound images, we report results from a pilot experiment which also extends the dataset to include onset-less syllables. The hypothesis is essentially confirmed with statistical analysis and we explore and discuss the effect of different vowels and onset types (including null onsets) on articulatory and acoustic RT and speech production.

Paper P3.20 (Presenter at poster: 10:00-11:30)

Complex patterns in silent speech preparation: Preparing for fast response might be different to preparing for fast speech in a reaction time experiment

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This paper presents articulatory data on silent preparation in a standard Verbal Reaction Time experiment. We have reported in a previous study [6] that Reaction Time is reliably detectable in Ultrasound Tongue Imaging and lip video data, and between 120 to 180 ms ahead of the standard acoustics-based measurements. The aim of the current study was to investigate in more detail how silent speech preparation is timed in relation to faster and slower Reaction Times, and faster and slower articulation rates of the verbal response. The results suggest that the standard acoustic-based measurements of Reaction Time may not only routinely underestimate fastness of response but also obscure considerable variation in actual response behaviour. Particularly tokens with fast Reaction Times seem to exhibit substantial variation with respect to when the response is actually initiated, i.e. detectable in the articulatory data.

Phonetics of Lesser Documented Languages

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.21 (Presenter at poster: 10:00-11:30)

Phonetic variation in Iu-Mien vowels

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The study presents an acoustic analysis of the phonetic variation in Iu-Mien vowels, not only for modal voice, but also

for creaky and pharyngealized vowels. Our findings are contrasted with those of Purnell [1, 2] and Bruhn [3].

Paper P3.22 (Presenter at poster: 10:00-11:30)

Acoustics of stød in Livonian

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The paper focuses on the phonetic realisation of the Livonian stød. An investigation of the temporal and tonal characteristics of words with and without stød consisting of a long first syllable and a short second syllable in spontaneous speech was carried out. The changes in pitch alignment, durations and duration ratios of the syllables in disyllabic words were analysed and the role of intensity was studied. The analysis revealed a difference in the observed acoustic characteristics in words with and without stød. The duration of the first syllable is more neutralised in both groups. In tonal characteristics two distinct patterns are evident. In words with stød, the pitch peak in the stressed syllable is earlier than in words without stød. The intensity in the first syllable is similar in both groups, but there is a difference in the interaction between the first and second syllable.

Paper P3.23 (Presenter at poster: 10:00-11:30)

Fricative rhotics in Nusu

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Among the world's languages fricatives are the rarest types of rhotics. They are found in a few African and European languages [13] and as allophones in some Romance languages [4, 8, 9, 12, 17]. Data from Nusu demonstrate the presence of rhotic alveolar fricatives in Asia. Even though they have sometimes been transcribed as retroflex sibilants in earlier studies [11, 20], phonotactic patterns suggest an interpretation as rhotics. A spectrogram comparison of Nusu alveolar sibilant and non-sibilant fricatives shows that the sibilant criterion of increased spectral intensity for higher frequencies is not met for the postulated rhotic. The tradition of interpreting alveolar fricatives as sibilants might at least partially be caused by the gap for non-sibilant alveolar fricatives in the chart of the International Phonetic Alphabet. The Nusu data and evidence from other Tibeto-Burman languages provide further support for Whitley's [22] plea for a more comprehensive treatment of rhotics.

Paper P3.24 (Presenter at poster: 10:00-11:30)

Phonetic realization of nasal vowels in Pwo

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The relationship between vowel nasalization and vowel quality has been examined in many studies, yet results are conflicting. This study examined nasal vowels in the Pwo language. The result showed that low nasal vowels had more nasalization than mid nasal vowels. A high correlation between nasalization and vowel duration was also found. Additionally, percentages of the total nasal duration were roughly similar across vowels. Possible explanations were offered for the observed patterns.

Paper P3.25 (Presenter at poster: 10:00-11:30)

Post-vocalic stop consonants in Mebengokre (Northern Jê, Brazil): A preliminary investigation

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This paper presents the first acoustic phonetic investigation of Mebengokre, a Jê language spoken in the Brazilian Amazon. Our focus lies in one conspicuous property of this language's phonetic structure: the frequent occurrence of unreleased stops in post-vocalic position. Based on auditory impressions from the field and on theoretical considerations we expected to observe variation in vowel duration and patterns of formant transition (especially F2) as a function of the presence or absence of a following consonant. Vowels in CVC syllables were found to be significantly shorter than those in CV, while formant patterns (F2 offset transitions) are less reliable in distinguishing the two conditions, due, arguably, to the highly context-dependent nature of this parameter. Finally, a large majority of the tokens analyzed contained no stop release burst that could be identified from the inspection of waveforms.

Paper P3.26 (Presenter at poster: 10:00-11:30)

Lexical tone in Lopit

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This paper presents the results of an acoustic investigation of lexical tone in the Dorik dialect of Lopit, an Eastern Nilotic language. Tonal phenomena in Nilotic languages are complex, and in many cases vastly underdescribed. In the limited descriptive work on Lopit, there is not yet a clear picture of the number of tones used for lexical contrasts, and the various grammatical functions of tone are only beginning to emerge. Acoustic results indicate that there are three distinct lexical tones: a High level tone, a Low level tone, and a Falling contour tone.

Paper P3.27 (Presenter at poster: 10:00-11:30)

Vowel duration and consonant lengthening in Djambarrpuynu

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This paper presents an analysis of acoustic duration of vowels in Djambarrpuynu, a Yolŋu Matha language spoken in Arnhem Land, in northern Australia. Djambarrpuynu has been described as having phonologically long and short vowels, and there have also been suggestions that consonants following short vowels undergo compensatory lengthening. The aims of this study are to investigate the phonetic nature of phonologically long and short vowels in Djambarrpuynu, and assess whether there is any evidence of consonantal lengthening. Results show that there are significant duration differences between the phonologically long and short vowels, and furthermore that consonants following short vowels have significantly greater duration than those after long vowels.

Paper P3.28 (Presenter at poster: 10:00-11:30)

The acoustic correlates of vowel pharyngealisation in Archi (East Caucasian)

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The paper offers an exploratory analysis of acoustic properties of pharyngealised vowels in Archi (East Caucasian).

Three speakers considered show variation in pharyngealisation correlates. Only one speaker is consistent in F3 lowering and duration increase across most vowels.

Phonetic Universals and Typology

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.29 (Presenter at poster: 10:00-11:30)

On the diphthongized vowels in Qimen Hui Chinese

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This paper gives an acoustic-phonetic description of the diphthongized vowels in the Qimen Hui dialect. The results suggest that the diphthongized vowels in Qimen have similar acoustic-phonetic properties with those in Yi County Hui, namely they belong to an intermediate category between monophthong and diphthong. However, the diphthongized vowels in Qimen are typologically closer to plain diphthongs in the continuum of monophthong and diphthong.

Paper P3.30 (Presenter at poster: 10:00-11:30)

The vowel inventory in the Xinfeng (Tieshikou) Hakka dialect

Zhang, Qian and Hu, Fang

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Based on an acoustic-phonetic analysis, this paper reports a unique vowel inventory in Tieshikou Hakka. Results show that Tieshikou vowels have four levels of height, and three degrees of backness. This is completely different from Meixian, the well-known representative dialect of Hakka. And the discrepancy between Tieshikou and Meixian Hakka sheds light on general issues concerning vowel inventory typology.

Paper P3.31 (Presenter at poster: 10:00-11:30)

Is there a general motor basis for final lengthening?

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Phrase-final lengthening is a proposed speech universal, also found in music performance, and is reported in animal communication, e.g. birdsong. In this paper, we ask whether there is a general motor basis for these behaviors. We recorded the finger movements of five participants as they traced groups of zigzags on paper. Results show that participants reliably signalled groupings by pausing or finger lifting between groups, but did not slow down their group-final movements. Some participants (but not all) showed slower group initial movements. These results suggest that we may need to look elsewhere for an explanation for the temporal prolongation of final movements observed in speech.

Speech Production and Articulation II: Techniques and Applications

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.32 (Presenter at poster: 10:00-11:30)

Investigating dialectal differences using articulography

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The present study introduces articulography, the measurement of the position of tongue and lips during speech, as a promising method for the study of dialect variation. By using generalized additive modeling to analyze articulatory trajectories, we are able to reliably detect aggregate group differences, while simultaneously taking into account the individual variation across dozens of speakers. Our results on the basis of Dutch dialect data show clear differences between the southern and the northern dialect with respect to tongue position, with a more frontal tongue position in the dialect from Ubbergen (in the southern half of the Netherlands) than in the dialect of Ter Apel (in the northern half of the Netherlands). Thus articulography appears to be a suitable tool to investigate structural differences in pronunciation at the dialect level.

Paper P3.33 (Presenter at poster: 10:00-11:30)

Multimodal imaging of glottal stop and creaky voice: Evaluating the role of epilaryngeal constriction

Moisik, Scott; Esling, John H.; Crevier-Buchman, Lise; Amelot, Angélique and Halimi, Philippe

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This paper investigates the role of epilaryngeal constriction in constricted laryngeal gestures such as creaky voice and glottal stop. Two imaging modalities were used to study canonical phonetic productions anchored by auditory targets. Laryngeal posture was examined in axial and sagittal sections using magnetic resonance imaging, and high-speed laryngoscopic video was used to study posturing and vibratory dynamics. Together these data support the view that epilaryngeal constriction plays a key role in suppressing vocal fold vibration most directly through a vertical compaction mechanism, whereby the vocal folds and ventricular folds come into contact, obliterating the ventricle. The effect of this is suggested to increase mechanical impedance to mucosal wave transmission resulting in the perturbed vibration observed in creaky voice or facilitating vibratory arrest in glottal stop.

Paper P3.34 (Presenter at poster: 10:00-11:30)

Silent speech recognition from articulatory movements using deep neural network

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Laryngectomy patients lose their ability to produce speech sounds and suffer in their daily communication. There are currently limited communication options for these patients. Silent speech interfaces (SSIs), which recognize speech from articulatory information (i.e. without using audio information), have potential to assist the oral communication of persons with laryngectomy or other speech or voice disorders. One of the challenging problems in SSI development is to accurately recognize speech from articulatory data. A deep neural network (DNN)-hidden Markov model (HMM) has recently been successfully used in (acoustic) speech recognition, which shows significant improvements over the long-standing approach Gaussian mixture model (GMM)-HMM.

However it has rarely been used in silent speech recognition. This paper investigated the use of DNNHMM in recognizing speech from articulatory movement data. The articulatory data in the MOCHA-TIMIT data set was used in the experiment. Results indicated the performance improvement of DNN-HMM over GMMHMM in silent speech recognition.

Paper P3.35 (Presenter at poster: 10:00-11:30)
The influence of tongue position on trombone sound: A likely area of language influence

Heyne, Matthias and Derrick, Donald

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This paper builds on initial evidence of First Language influence on brass playing presented in Heyne and Derrick (2013) [13] by indicating how tongue positioning might affect trombone timbre. Ultrasound imaging of the tongue was used to compare vowel production and sustained trombone notes for three participants, one each of New Zealand English, Tongan and Japanese, whose musical production was also analyzed acoustically. Comparison of the sound spectra produced by two semiprofessional players shows that the player using a higher, more retracted tongue position displays a larger component of high frequencies in the produced sound spectrum. We believe that this could explain why brass players can notice differences between players from different language backgrounds.

Paper P3.36 (Presenter at poster: 10:00-11:30)
Comparing L1 and L2 speakers using articulography
Wieling, Martijn; Veenstra, Pauline; Adank, Patti; Weber, Andrea and Tiede, Mark
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This study uses articulography, the measurement of the position of tongue and lips during speech, as a tool to quantitatively assess the differences between pronunciations of native and non-native (Dutch) speakers of English. In our study, we focus on two pairs of English sound contrasts: /s/-/ʃ/ and /t/-/θ/. Our analysis focuses on the anterior-posterior position of the tongue tip during the pronunciation of minimal pairs containing the contrasting sounds. Our results indicate that the contrast between /s/ and /ʃ/ made by the Dutch L2 speakers is slightly reduced compared to the contrast produced by the English L1 speakers. For the contrast /t/-/θ/, our findings show that while native English speakers clearly produce this contrast, Dutch speakers do not. Our results line up with earlier studies on the basis of acoustic data, and also illustrate that articulography is a suitable method of investigating pronunciation differences between first and second language speakers.

Paper P3.37 (Presenter at poster: 10:00-11:30)
A statistical shape space model of the palate surface trained on 3D MRI scans of the vocal tract
Hewer, Alexander; Steiner, Ingmar; Bolkart, Timo; Wuhrer, Stefanie and Richmond, Korin
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We describe a minimally-supervised method for computing a statistical shape space model of the palate surface. The model is created from a corpus of volumetric magnetic resonance imaging (MRI) scans collected from 12 speakers. We extract a 3D mesh of the palate from each speaker, then

train the model using principal component analysis (PCA). The palate model is then tested using 3D MRI from another corpus and evaluated using a high-resolution optical scan. We find that the error is low even when only a handful of measured coordinates are available. In both cases, our approach yields promising results. It can be applied to extract the palate shape from MRI data, and could be useful to other analysis modalities, such as electromagnetic articulography (EMA) and ultrasound tongue imaging (UTI).

Phonetics of Second and Foreign Language Acquisition II: Predictors of Acquisition Success

Wednesday, August 12, 2015, 10:00-11:30

Paper P3.38 (Presenter at poster: 10:00-11:30)

Degree and direction of foreign accent in L2 and L3 Korean speech

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The current study explores the potential influence of an L2 on the acquisition of L3, in the context of English speaking learners of Japanese (the L2) and Korean (the L3). As a means to assess the degree of influence of the L1 accent and L2 accent in L3 production, an experiment involving the perceptual judgment of a foreign accent was developed. Two groups of native English speakers [(i) five who had not learned any languages other than Korean, and (ii) five who had learned Japanese before learning Korean] produced Korean sentences, and 15 native Korean speakers ranked each production according to the speaker's dominant accent, either English or Japanese. Based on the results of the quantitative analysis, it is suggested that L2 exerts an influence on L3 accent; however, this interference is decreased with an increase in L3 proficiency.

Paper P3.39 (Presenter at poster: 10:00-11:30)

Differentiation and interaction in the vowel productions of trilingual children

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This study investigates the vowel productions of two simultaneous trilingual sisters, aged 6;8 and 8;1, who are growing up with English, Italian and Spanish in California. The children's realisations were analysed acoustically and compared to those of the main adult input providers in their home, using Watt and Fabricius' S-centroid vowel normalisation procedure [3, 16]. The results revealed a high degree of within-language and cross-language differentiation for both children, but also some evidence for cross-linguistically overlapping patterns. At the same time, many of the children's productions differed from those of the input providers. Together, the results suggest complex cross-linguistic interactions as well as the influence of socio-phonetic factors.

Paper P3.40 (Presenter at poster: 10:00-11:30)

The effect of early bilingualism on perceived foreign accent

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A high degree of between-rater variability in pronunciation assessment is often reported in literature. However, human assessments of pronunciation skills of second language (L2) learners are used in standardized language-proficiency tests. Besides, these scores are used as a reference point in evaluating computer-based systems for pronunciation teaching and testing. Therefore it is important to be aware of rater-related factors that might affect the degree of perceived foreign accent in L2 speech. We used Cronbach's alpha and inter-class coefficient to estimate the between-rater agreement of 10 native English speakers who assessed accentedness in L2 utterances. We found that early immersion into a bilingual environment might affect the degree of perceived foreign accent. This finding can be explained by the interaction of two linguistic systems in early language acquisition, when phoneme prototypes are formed based on language-specific fine phonetic details.

Paper P3.41 (Presenter at poster: 10:00-11:30)

Does interest in language learning affect the non-native phoneme production in elderly learners?

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Second language (L2) learning is widely studied in adult learners. This study was conducted in order to see how auditory training affects elderly learners' L2 speech production and whether linguistically oriented seniors can benefit more from training compared to seniors not showing special interest in foreign languages. Hence, we studied seniors recruited from language courses and seniors with other than L2 related interests. The two day study included listen-and-repeat trainings and production tests. The trained words included vowels from which the three first formants and their standard deviations were measured and analysed. The results showed that formant values changed differently as a function of training in the two groups. Also, the standard deviations developed differently: only the linguistically oriented seniors showed a deviation decrease, indicating non-native learning. This study showed that learning to produce a non-native phoneme can be easier for elderly learners who show a general interest in languages.

Paper P3.42 (Presenter at poster: 10:00-11:30)

L2 pronunciation proficiency, language use and age of acquisition as predictors of executive control in bilinguals

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The primary objective of this study was to investigate the extent to which second language (L2) pronunciation proficiency, language use, and age of L2 acquisition (AoA) are associated with variation in enhanced executive control in bilinguals. The secondary objective was to examine whether bilinguals' executive control, as reflected in the incongruent response time for the Flanker task, differed from a group of monolinguals. A multiple regression revealed that although neither pronunciation proficiency in the L2 of English nor AoA were significant in predicting enhanced executive control, L2 use was highly significant. However, there

was no significant difference between the incongruent response times of the bilinguals versus the monolinguals. The findings suggest that different forms of bilingualism, as a noncategorical experience, impact executive control differently, and that not all forms of bilingualism are equally afforded an advantage in executive control over monolingualism.

Paper P3.43 (Presenter at poster: 10:00-11:30)

The effects of length of residence (LOR) on L2 English phonology

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This study is a phonetic investigation of six Cantonese L1-English L2 students living in English-speaking countries. The students were recorded three times during their first year abroad: before immigration, at six months, and at one year. Phonetic details from the three recordings have been measured and compared. Preliminary results suggest gradual but significant phonological reorganization during their first year after immigration. Suprasegmental modifications include increases in speech rate, a higher durational variability for vowels, and a lower global vocalic content in utterances. Segmental modifications include a widening distinction between /i:/ and /ɪ/, and, among the students studying in North America, a propensity for replacing word-medial [t^h] with alveolar flaps. Taken together, these findings can broaden understanding of L2 phonological development, and the ways in which isolated phonetic modifications contribute to global foreign accent.

Paper P3.44 (Presenter at poster: 10:00-11:30)

Factors affecting successful late learners' phonemic discrimination between /l/ and /r/ in English

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The view "the earlier the better" (e.g. [10]) may be a myth in a foreign language instructional setting (e.g. [1]). To identify successful late learners, this study compares early and late learners studying English as a foreign language in the situation of classroom minimal exposure to English, focusing on the perception of English consonants ([l, r]) produced by different talkers with and without noise. In addition, it clarifies what factors have influenced the success of late learners in perceiving the difficult phonemic contrast. The findings did not show any age effects of English input on the phonemic discrimination, regardless of the noise and talker variability. The successful late learners, who outperformed the early learners and did not differ from the native speaker group, were generally proficient in English and actively used English both in and outside of the classroom.

Paper P3.45 (Presenter at poster: 10:00-11:30)

Mapping second language learners' accent of Spanish

Kim, Ji Young and Shih, Chilin

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The goal of this study is to provide a global view of Spanish second language (L2) accent and to identify the sounds and structures that lead to the perception of foreign accent. We designed a list of real Spanish monosyllabic words with various syllable structures that covers all phonemes in Spanish.

The words were produced by L2 learners and native speakers and rated by native listeners. We used mixed effects regression models to evaluate the contributions of factors including consonant, vowel, and syllable structure, among others, to the perceived accent rating of each word. The results of this study are consistent with the predictions of prevailing theories in second language acquisition (SLA), while providing a global view with a quantitative measurement of L2 Spanish accent for all sounds.

Paper P3.46 (Presenter at poster: 10:00-11:30)

Investigating frequency of occurrence effects in L2 speakers: Talent matters

Vais, Jonathan; Lewandowski, Natalie and Walsh, Michael

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This paper investigates the impact of word frequency and pronunciation talent on proficient speakers' second language (L2) production variability/similarity. The data analysed stem from a corpus of quasi-spontaneous conversations between native speakers of German and English. Within-speaker production similarity was established through a comparison of amplitude envelope signals for word tokens of L2 English word types. Production similarity scores, type frequency, and speaker talent were used as input for several linear (mixed effects) models. The models yielded a significant effect of type frequency, and a significant interaction of type frequency and talent, for predicting similarity. The results are discussed in the context of exemplar-based category formation and indicate that less talented speakers are less capable of forming L2 categories.

Paper P3.47 (Presenter at poster: 10:00-11:30)

A dynamic approach to phonetic change

Tobin, Stephen

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Investigations into phonetic accommodation reveal that convergence in interlocutors' phonetic forms is typical. However, there is considerable between-speaker variation in the extent of this convergence. In this investigation, I propose that some of this variation can be attributed to language-specific differences in articulatory timing stability (VoiceOnset-Time) and that a dynamical systems approach gives a better account of such findings than extant theories/models. Spanish-English and Korean-English bilinguals, and monolingual English controls completed word shadowing tasks to induce phonetic accommodation and word reading tasks to measure accommodation. The results confirm that between-language differences in articulatory timing stability influence the likelihood of phonetic change and that a dynamical approach provides the best account of the effect.

08:00-14:00	Registration (<i>Hall 1</i>) and Exhibition (<i>Hall 2</i>)				Speaker room (<i>Etive</i>)			
ORAL Session 7								
09:00-10:00	7.1 Articulation and Coarticulation	7.2 Sociolinguistics and Speech Perception	7.3 Prosodic Phrasing	7.4 Bilingualism	7.5 Imitation	7.6 Conversation and Listener Effects	7.7 L2 Training and Feedback	7.8 Rhythm, Stress, and Voice Onset Time
10:00-11:30	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 3 (<i>Hall 1</i>)			
ORAL Session 8								
11:30-12:30	8.1 Word Recognition	8.2 Conversation Tasks	8.3 Chinese Learners of English	8.4 Vowel Perception	8.5 Phonetics of Emotion	8.6 Phonetics of Singing	8.7 Prosodic Boundaries	8.8 Clinical Phonetics: Articulation
12:30-14:00	LUNCH				IPA meeting (<i>Dochart 2</i>)			
SATELLITE Meetings								
13:30 -19:00	Biomechanical Tongue Models (14:00-16:00)	Evolution of Phonetic Capabilities (14:00-18:30)	Prosodic Alphabet (13:30-18:00)	Phonetic Learner Corpora (14:00-19:00)	Geminate Consonants (14:00-18:00)	Articulography (14:00-18:30)	Singing in Tone (14:00-18:00)	

DAY 4: Thursday, August 13, 2015**ORAL SESSION 9****9.1: Clinical Phonetics: Neurological Disorders***Thursday, August 13, 2015, 09:00-09:45, Dochart 1**Chair: Suzanne Boyce*

Session 9.1, Paper 1 (09:00-09:15)

Onset coordination in essential tremor patients with deep brain stimulation: An EMA study*Mücke, Doris; Hermes, Anne; Niemann, Henrik; Becker, Johannes and Barbe, Michael
anne.hermes@uni-koeln.de*

The present study is the first kinematic study to investigate the speech production of ET patients with VIM-DBS. More specifically, it explores the coordination patterns of articulatory gestures in syllables with simple and complex onsets, CV and CCV, in German. It provides a preliminary analysis of gestural coordination under stimulation for the target words /lima/ and /klima/ in the framework of Articulatory Phonology. The findings reveal a timing deficit in the phonetic realization of competing coupling relations for complex onsets for the patients. The observed perturbation of gestural phase relations can be related to the coupling hypothesis of syllable structure and are taken to be a symptom for dysarthria.

Session 9.1, Paper 2 (09:15-09:30)

Acoustic correlates of Spanish stress in fluent and non-fluent aphasia: A preliminary study*Baque, Lorraine
lorraine.baque@uab.cat*

The aim of this study is to determine whether fluent and non-fluent aphasics preserve the acoustic marks of lexical stress in a repetition task involving regular oxytone and paroxytone disyllabic Spanish words in isolation. Acoustic analyses of each syllable (duration, F0, intensity) were performed. These data were then subjected to mixed-effects regression analyses, separately for oxytones and paroxytones, with subjects and items as random variables, and group, stress, syllable structure and all the possible interactions as predictors. The results showed a different use of acoustic cues to lexical stress in both fluent and non-fluent aphasics as compared to controls. In non-fluent aphasics, abnormal acoustic characteristics were found that involved not only timing aspects but also F0 and intensity cues. In fluent aphasics, a "subtle phonetic deficit" was observed in lexical stress processing, especially in oxytones with complex first syllable structure.

Session 9.1, Paper 3 (09:30-09:45)

Fluctuating accent in foreign accent syndrome: A case study*Roy, Johanna-Pascale; Martel-Sauvageau, Vincent and Ma-coir, Joël
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Foreign accent syndrome (FAS) is a rare acquired neurogenic speech disorder characterised by the emergence of an accented speech pattern. The aim of this study is to describe the speech characteristics of LK, a FAS speaker who also shows fatigue and cognitive difficulties. Perceptual as well as acoustic analyses show that LK's speech characteristics are comparable to those found in the literature, but also to those of speakers with apraxia of speech (AOS). The cognitive assessment shows that LK presents with deficit in inhibition control whereas other executive functions and short-term/working memory are unimpaired. Acoustic analyses show that speech characteristics enabling the detection of a foreign accent were intensified with tiredness. Moreover, agrammatism emerges in spontaneous speech with tiredness. This speaker, unlike AOS ones, would be able to use compensatory mechanisms in order to maintain appropriate phonological contrasts. With tiredness, this ability declines and FAS characteristics exacerbate.

9.2: Assimilation*Thursday, August 13, 2015, 09:00-09:45, Dochart 2**Chair: Linda Shockey*

Session 9.2, Paper 1 (09:00-09:15)

Prosodic conditioning of pre-sonorant voicing*Bárkányi, Zsuzsanna and Beňuš, Štefan
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The present study investigates the influence of prosodic structure on pre-sonorant voicing in Slovak. Our results demonstrate that prosodic boundaries as well as accent interact in a meaningful way with voicing assimilation. If a major boundary intervenes, the role of accent is eliminated, while in other contexts the presence of contrastive focus induces less voicing. A novel finding of the study is that sonorant consonants and vowels differ considerably in this assimilation process. It is also demonstrated that pre-sonorant voicing in Slovak is categorical but optional and is close to being completely neutralizing.

Session 9.2, Paper 2 (09:15-09:30)

The cap's out of the bag: Place assimilation is common in infant-directed speech*Buckler, Helen; Goy, Huiwen; Kow, Julie and Johnson, Elizabeth K.
helen.buckler@utoronto.ca*

Adult-directed speech (ADS) contains many words that deviate from their canonical form due to connected speech processes such as coronal place assimilation (e.g. 'cat' realized as 'cap' in the phrase 'cat box'). Here, we ask how often this occurs in Infant-directed speech (IDS), which is often believed to be articulated more clearly than ADS. Mothers

of 18-month-olds were recorded producing pairs of phrases that did or did not license assimilation (e.g., cat box/cap box) while addressing either their infant (IDS) or another adult (ADS). Both scripted and unscripted utterances were collected. Key phrases were extracted and presented to adults for identification in a forced choice task, with the expectation that listeners would more accurately identify tokens with less assimilation. Surprisingly, adults identified phrases more accurately in ADS than IDS, suggesting that assimilation occurs frequently in IDS, as it does in ADS, regardless of whether the speech is scripted or not.

Session 9.2, Paper 3 (09:30-09:45)

Voicing assimilation at accentual phrase boundaries in Hungarian

Mády, Katalin and Bárkányi, Zsuzsanna
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According to the traditional phonological literature, regressive voicing assimilation in obstruent clusters is an obligatory categorical, completely neutralising process in Hungarian, as long as no major prosodic boundary signalised by a longer pause intervenes between the target and the trigger. In the present experiment, the effect of minor prosodic boundaries, i.e. accentual phrases (AP) on the degree of voicing assimilation was investigated. According to the analysis, assimilation is weakened in stops, but not in fricatives before AP boundaries. Assimilation is blocked for both stops and fricatives if followed by a pause. Thus, the voicing assimilation process is sensitive both to the type of obstruents involved and to the strength of minor boundary marking.

9.3: Learning Chinese

Thursday, August 13, 2015, 09:00-09:45, Carron 1

Chair: Peggy Mok

Session 9.3, Paper 1 (09:00-09:15)

L2 experience modulates learners' use of cues in the perception of L3 tones

Qin, Zhen and Jongman, Allard
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It is unclear what roles native language (L1) and second language (L2) play in the perception of lexical tones in a third language (L3). Listeners with different language backgrounds use different F0 cues in tonal perception. While English listeners use F0 height, Mandarin listeners rely more on F0 direction. The present study addresses whether knowledge of Mandarin as an L2 results in listeners' reliance on F0 direction in their perception of L3 (Cantonese) tones. 15 English-speaking L2 learners of Mandarin were compared to 15 monolingual English speakers and 15 native Mandarin speakers as control groups. All groups discriminated Cantonese tones either by distinguishing a contour tone from a level tone or a level tone from another level tone. The L2 learners patterned differently from the control groups by using both F0 height and direction. Hence, L2 experience as well as L1 experience was found to modulate perception of L3 tones.

Session 9.3, Paper 2 (09:15-09:30)

Tonal coarticulation in L2 standard Chinese

Brengelmann, Tingting; Cangemi, Francesco and Grice, Martine
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In this paper we investigated tonal coarticulation in German learners' production of Standard Chinese, as compared to the production of native speakers. Examination of the f0 contour at the end of target syllables revealed that when syllables were uttered in isolation, there was more variability across productions for the learners than for the native speakers. Moreover, this variability increased when the target syllable was followed by a further syllable to form a disyllabic word. Thus, German learners exhibit not only more variability in their production but also more anticipatory coarticulation than their native counterparts.

Session 9.3, Paper 3 (09:30-09:45)

English learners' perception and production of Mandarin intonation

Luo, Shan and Lin, Hua
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This study investigates pitch interplay in non-native (L2) speech. Specifically, experiments were conducted to examine how native English speakers perceive and produce Mandarin statements and unmarked questions. Results from the perceptual experiment showed English listeners did not resolve the simultaneous pitch cues from intonation and tone the same way as native Mandarin speakers. They had less difficulty identifying intonation when the pitch movement of intonation and tone was in the same direction versus when they were not. The production experiment showed that the intelligibility of the English speakers' question intonation was especially compromised due likely to their narrower pitch range than that found in native production.

9.4: Syllabic and Prosodic Aspects of L2 Production

Thursday, August 13, 2015, 09:00-09:45, Carron 2

Chair: Radek Skarnitzl

Session 9.4, Paper 1 (09:00-09:15)

Temporal variables in first and second language speech and perception of fluency

Rose, Ralph
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Evidence is accumulating that many temporal features of second language speech are correlated with those of first language speech. This study looks at the correlation between articulation rate, pause rate, and mean pause duration in Japanese first and English second language speech and how second language fluency raters perceive these. In a cross-linguistic corpus of spontaneous speech, mean pause duration was found to have a near-high correlation while the other two temporal variables have a moderate correlation. A subsequent elicitation of fluency judgments on the second language English speech via Amazon Mechanical Turk showed that ratings were highly dependent on pause dura-

tion, rather less on articulation rate, but not on pause rate. Results suggest that raters' perception of second language fluency is divergent from speakers' actual second language development: Ratings are related to features that are not indicative of second language development but rather of individual speech patterns.

Session 9.4, Paper 2 (09:15-09:30)

Assessing L2 phonemic acquisition: A normalization-independent method?

*Méli, Adrien and Ballier, Nicolas
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This paper aims at addressing the issues that emerge when attempting to analyse the acquisition of L2 vowels. Studies usually embed vowels in the same /hVd/ template (e.g. Hillenbrand [14], Ferragne [10], Clopper [9]) in order to reduce coarticulatory effects, and the number of occurrences of each vowel is carefully controlled in order to comply with normalization constraints (e.g. Lobanov [17]). However, such methods make it difficult to test the predictions of SLA models that base phonemic acquisition on phonemic parameters only (Flege [11], Best [2],[3]). This study investigates the development of advanced French learners in the acquisition of phonemic contrasts (/i:-/ and /U:-/) in the longitudinal DIDEROT LONGDALE [13] corpus. 15 speakers (12 female & 3 male) were recorded in spontaneous interviews over a period of two years. To test whether the acquisitions of the /i:-/ and /u:/ contrasts are similar, a metric, the Ratio of the (contrast) Distance to the vowel space Convex Hull (RaDiCHull, /ræd.k.'hʌl/), is explored with different normalizing procedures to measure learner input as compared to native speakers of English. (The reference points are from Hillenbrand [14] for values in Hz, and from Clopper [9] for values in Bark).

Session 9.4, Paper 3 (09:30-09:45)

Realizations of French voiced fricatives by German learners as a function of speaker level and prosodic boundaries

*Bonneau, Anne
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We analyzed the realizations of French voiced fricatives /z, ʒ/ by German learners of French as a function of learners' levels and prosodic boundaries. Fricatives are embedded in sentences and appear in final position of an accentual group, but not in sentence final position. Results showed that the performance of the speakers is linked to the way they realized boundaries. In particular, we observe that advanced speakers preferred to realize no pause after the fricatives, and that, in this intervocalic context, these speakers produced more voiced fricatives than beginners.

9.5: Nasality

Thursday, August 13, 2015, 09:00-09:45, Boisdale 1

Chair: Michael Ashby

Session 9.5, Paper 1 (09:00-09:15)

2D Articulatory velum modeling applied to copy synthesis of sentences containing nasal phonemes

*Laprie, Yves; Elie, Benjamin and Tsukanova, Anastasia
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Articulatory synthesis could become a valuable tool to investigate links between articulatory gestures and acoustic cues. This paper presents the construction of an articulatory model of the velum which is intended to complete a model already comprising other articulators. The velum contour was delineated and extracted from a thousand of X-ray images corresponding to short sentences of French. A principal component analysis was applied in order to derive the main deformation modes. The weight of images corresponding to an open velopharyngeal port was increased in the analysis so as to obtain linear components rendering the velum deformation modes. The first corresponds to the opening and comes with a shape modification linked to the apparition of a bulb in the upper part of the velum when it rises. The area function of the oral tract is modified so as to incorporate the velum movements. This model is connected with acoustic simulations in order to synthesize sentences containing nasal French vowels and consonants.

Session 9.5, Paper 2 (09:15-09:30)

The aerodynamics of vowel nasality and nasalization in Brazilian Portuguese

*Desmeules-Trudel, Félix
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Brazilian Portuguese (BP) is thought to possess contrastive nasal vowels that are different from contextually nasalized vowels in its phonological system. Aerodynamic data (nasal and oral airflow) of 11 native speakers show that interspeaker variability is important in this language with regard to the nasal airflow ratio of tautosyllabic nasal vowels (TNVs; campo [kēpu] 'field') and heterosyllabic nasalized vowels (HNVs; cama [kame] or [kāme] 'bed'). This shows that TNVs are not thoroughly differentiated from HNVs in production throughout the whole duration of the vowels, and speaker-specific variability is important, thus suggesting that vowel nasality has not reached a fully contrastive status in this language. A stage of assimilation of nasality on the vowel in the evolution of the phonological system is suggested as the explanation for the observed differences between HNV and TNV and the apparently ambiguous status of vowel nasality in BP.

Session 9.5, Paper 3 (09:30-09:45)

Coarticulation and contrast: Neighborhood density conditioned phonetic variation in French

*Scarborough, Rebecca; Styler, Will and Marques, Luciana
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Phonological neighborhood density (ND) conditions variation in a number of acoustic phonetic properties of words. For example, previous research has shown greater hyperarticulation and greater nasal coarticulation in high-ND English words than in low-ND words. Here, we investigate the effects of ND on vowel hyperarticulation and vowel nasality (coarticulatory and contrastive) in French. Acoustic analysis of elicited French data revealed some ND patterns that paralleled those reported for English, but also some language-specific patterns. In particular, we found greater hyperarticulation for oral vowels in Hi-ND vs. Lo-ND words, but greater

centralization for nasal vowels in Hi-ND vs. Lo-ND words. However, we did not find ND effects for vowel nasality in either coarticulatory or contrastive contexts. We discuss both the ND effects found and the apparent lack of others in terms of the language-specific relationship between oral and nasal vowels and between coarticulatory and contrastive nasality in French.

9.6: Phonetics-Phonology Interface III

Thursday, August 13, 2015, 09:00-09:45, Boisdale 2

Chair: Jane Stuart-Smith

Session 9.6, Paper 1 (09:00-09:15)

The perceptual basis of the feature vowel height

*Chládková, Kateřina; Boersma, Paul and Benders, Titia
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The present study investigated whether listeners perceptually map phonetic information to phonological feature categories or to phonemes. The test case is a phonological feature that occurs in most of the world's languages, namely vowel height, and its acoustic correlate, the first formant (F1). We first simulated vowel discrimination in virtual listeners who perceive speech sounds through phonological features and virtual listeners who perceive through phonemes. The simulations revealed that feature listeners differed from phoneme listeners in their perceptual discrimination of F1 along a front-back boundary continuum as compared to a front (or back) continuum. The competing predictions of phoneme-based versus feature-based vowel discrimination were explicitly tested in real human listeners. The real listeners' vowel discrimination did not resemble the simulated phoneme listeners, and was compatible with that of the simulated feature listeners. The findings suggest that humans perceive vowel F1 through phonological feature categories like /high/ and /mid/.

Session 9.6, Paper 2 (09:15-09:30)

Acoustic phonetic properties of mid vowels in New Caledonian French

*Lewis, Eleanor
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This paper investigates production of the mid vowels /e, ε, ø, œ, o, ɔ/ by four speakers of New Caledonian French (NCF). Formant and durational properties of these vowels are examined with respect to the type of syllable in which they occur. Results point to general adherence to the loi de position in NCF, such that the close-mid vowels occur in open syllables and the open-mid vowels occur in closed ones. There is, however, interspeaker variation concerning the realization of open syllable /ε/. There is also some evidence of /ɔ/-centralization in NCF, and of phonetically higher productions of /e/ and /o/ relative to other varieties.

Session 9.6, Paper 3 (09:30-09:45)

French high-mid vowels are underspecified for height

*de Jonge, Mirjam J.I. and Boersma, Paul
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Asymmetries in Mismatch Negativities (MMNs) have been

reported as evidence for phonological underspecification in speech perception. In this study, we investigated whether predictions from Lahiri's Featureally Underspecified Lexicon (FUL) model hold true in a language (French) and a contrast (vowel height) not investigated before, in contrast to predictions from a model with equipollent features or from Element Theory. The MMNs from French listeners to contrasts among the four vowels [y, u, ø, o] show clear asymmetries that are in line with FUL's predictions for vowel height and place. The change from a back vowel to a front vowel elicits stronger responses than vice versa, which generalises existing findings. The change from a high vowel to a high-mid vowel also elicits stronger responses than the reverse change, which is a new finding that supports the idea that the height contrast in these vowels is expressed by the privative feature [HIGH].

9.7: Speech Production: Models and Methods

Thursday, August 13, 2015, 09:00-09:45, Alsh

Chair: Stefan Frisch

Session 9.7, Paper 1 (09:00-09:15)

Simulating online compensation for pitch-shifted auditory feedback with target approximation model

*Liu, Hao and Xu, Yi
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This study attempts to achieve modeling simulation of the well-known phenomenon of online compensation for pitch-shifted auditory feedback. We used the Target Approximation (TA) model as the underlying kinematic mechanism of pitch contour generation, and simulated feedback compensation through responsive perturbation of the height parameter of the TA model. Results show that both within-syllable and cross-syllable pitch compensation in disyllabic utterances can be replicated. Furthermore, our data analysis also revealed an over-rectification phenomenon. By adjusting the height parameter back and beyond its original value after the compensation, the over-rectification was also replicated, further improving the overall simulation results.

Session 9.7, Paper 2 (09:15-09:30)

Physical models of the vocal tract sound different with the same shape but different temporal characteristics and vice versa

*Arai, Takayuki
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Two physical models of the human vocal tract have been successfully developed for producing English /l/ and /r/ and Japanese /r/. The first model was originally designed for the alveolar lateral approximant and the retroflex approximant, while the second model was designed to produce English "bunched /r/". With these models, we observed that different configurations of the vocal tract can produce similar sounds in addition to retroflex and bunched /r/. We also observed that the models produce the target sounds when the articulators move with certain patterns of temporal change. However, moving the same articulators with the same movement but different temporal patterns produced

less intelligible and/or different sounds. Thus, using the two physical models, we tested and confirmed that different configurations of the vocal tract using similar temporal changes yielded similar sounds, while the same configuration of the vocal tract with different temporal changes yielded different sounds.

Session 9.7, Paper 3 (09:30-09:45)

Examining speech production using masked priming

*Davis, Chris; Shaw, Jason A.; Proctor, Michael; Derrick, Donald; Sherwood, Stacey and Kim, Jeesun
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The time to initiate naming a printed target word is reduced when preceded by an identical masked prime (match prime) or by one that has the same initial letter (onset prime) compared to an all letter different control. Masked priming has been examined using vocal response time but offers an opportunity to examine speech production dynamics before the onset of speech acoustics. We tracked tongue-dorsum, tongue-tip and lip motion from four participants pronouncing 19 targets in match, onset and unrelated control prime conditions. Control primes were selected so their articulation involved a different tongue gesture than the target. Prime influence was measured by tongue-dorsum height at gestural onset and peak velocity of the subsequent gesture. Results showed that relative to targets in the match condition, control targets had a significantly different tongue dorsum height and the peak velocity was greater when the subsequent gesture was achieved.

native- and non-native sound systems. This suggests that web-based experimentation is a viable means of examining non-native speech perception, creating opportunities to test a wider array of participant populations.

Session 10.1, Paper 2 (11:45-12:00)

Effects of attention and training method on the identification of American English vowels and coda nasals by native Japanese listeners

Nozawa, Takeshi

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The accuracy with which native Japanese listeners identified American English vowels and coda nasals was assessed before and after training. The listeners were divided into four groups, each of which received a different type of training. Two of the four groups were vowel-oriented; one of these groups received vowel identification training (VI), while the other received vowel discrimination training (VD). The other two groups were nasal-oriented. One of the nasal-oriented groups received nasal identification training (NI), and the other received nasal discrimination training (ND). The results revealed that the VI group made more gains in its ability to identify vowels than the other groups after training. However, training appeared to have no effect on nasal identification, and no significant difference among the groups was observed.

Session 10.1, Paper 3 (12:00-12:15)

Identification vs. discrimination training: Learning effects for trained and untrained sounds

*Carlet, Angelica and Cebrian, Juli
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This paper presents the results of two high variability phonetic training regimes aimed at improving the perception of five English vowels, namely /æ,ʌ,ɪ,i,ɜ:/ by Spanish/Catalan speakers learning English as a second language (L2). 60 learners of English as an L2 took part in a pretest/training/post-test study and were assigned to one of two training methods (forced-choice identification training, AX discrimination training) and a control group. Vowel training was administered with CVC nonsense words. Pre- and post-tests involved consonant and vowel identification of nonsense words and generalization to real words. Results indicate that both trained groups significantly outperformed the controls on the trained sounds, showing a positive effect of both training regimes. Identification trainees improved to a greater extent than discrimination trainees on the perception of trained segments. However, a tendency towards improvement with the untrained segments was observed for the learners who received discrimination training only.

Session 10.1, Paper 4 (12:15-12:30)

Teaching listening in L2: A successful training method using the word-spotting task

*Delvaux, Véronique; Huet, Kathy; Calomme, Mélanie; Harmegnies, Bernard and Piccaluga, Myriam
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In this study, we assessed the efficiency of a learning sequence based on both implicit (using the word-spotting task) and explicit teaching of word boundary detection in an EFL classroom, using two cues: lexical stress and phonotactic

ORAL SESSION 10

10.1: Training L2 Perception

Thursday, August 13, 2015, 11:30-12:30, Carron 1

Chair: Ocke-Schwen Bohn

Session 10.1, Paper 1 (11:30-11:45)

Learning non-native phonotactic constraints over the web

*Steele, Ariana; Denby, Thomas; Chan, Chun and Goldrick, Matthew
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Although it is well known that a listener's linguistic experience influences their perception of non-native speech sounds, many researchers have access to a limited range of listener populations. Building on recent work, we examined if this issue could be addressed by conducting non-native speech perception experiments over the internet. We developed a web-based version of an implicit learning paradigm that exposes participants to novel phonotactic constraints. We found that native English listeners could acquire novel constraints based on both native- and non-native language auditory stimuli. Critically, the degree of success in learning non-native patterns reflected the relationship between the

tic constraints. Results showed that: (i) students from the experimental group achieved significantly more progress from pre-test to post-test than students from the control group; (ii) low-skilled listeners most benefited from the learning sequence; (iii) both explicit instruction (and related exercises) targeting segmentation subskills and practice using the word-spotting task were beneficial to the EFL learners.

10.2: Vowels, Dialects, and Speech Styles

Thursday, August 13, 2015, 11:30-12:30, Boisdale 1

Chair: Cynthia Clopper

Session 10.2, Paper 1 (11:30-11:45)

The acoustic realization of the /a/-/ə/ alternation in Majorcan Catalan

Amengual, Mark

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This study examines the acoustic realization of the Catalan /a/-/ə/ alternation as a function of lexical stress together with the production of the Majorcan Catalan stressed /ə/ by 30 Spanish-dominant and 30 Catalan-dominant early Spanish-Catalan bilinguals in Majorca (Spain). The acoustic analyses show that there are no differences between language dominance groups in the implementation of the phonological Catalan vowel reduction rule: both groups consistently produced /a/ as a central mid-vowel [ə] in unstressed position. The analysis of Majorcan stressed /ə/ revealed that both groups differed in their phonetic behavior: the stressed /ə/ of Spanish-dominants was realized with a higher F2, approximating the front mid-vowel acoustic region. A closer analysis of the individual data confirms that the degree of language dominance plays a significant role in the production of this dialectal feature.

Session 10.2, Paper 2 (11:45-12:00)

Tongue articulation of front close vowels in Stockholm, Gothenburg and Malmöhus Swedish

Frid, Johan; Schötz, Susanne; Gustafsson, Lars and Löfqvist, Anders

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Articulatory data were collected for the Swedish vowels /i:/, y:, ɿ:/ from nine speakers each of Stockholm, Gothenburg, and Malmöhus Swedish, and the tongue positions and their dynamics analysed using Functional Data Analysis (FDA). Results showed that the general tongue positions for /i:/ and /y:/ are similar and clearly different from /ɿ:/ in all three dialects. Variation within the Stockholm and Gothenburg groups led to a subdivision into two types, where the tongue positions of type 1 resembled Malmöhus Swedish more. Several differences in tongue articulation between types 1 and 2 were observed, possibly explained by the presence of Viby-coloured /i:/ and /y:/ in type 2.

Session 10.2, Paper 3 (12:00-12:15)

The interaction of vowel length and speech style in an Arapaho speech corpus

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Cross-linguistically, vowel length contrasts may involve changes in vowel quality. In a different but more gradient way, speech style influences vowel articulation. While both alter vowel acoustics, it remains unclear whether both are byproducts of general processes of vowel undershoot or reflect a modification of articulatory gestures independent of durational constraints. This study investigates the influence of distinctive vowel length and speech style on vowel production in an Arapaho speech corpus. We find that length contributes most strongly to differences in duration and vowel quality, where short vowels are more centralized and long vowels more peripheral. However, the effect of speech style is asymmetrical: long vowels undergo greater durational compression in narrative speech than short vowels do, but the latter undergo greater changes in quality. These findings support the view that speech style produces not only patterns of vowel undershoot, but also active changes in vowel articulation.

Session 10.2, Paper 4 (12:15-12:30)

Extending a North American English category learner to a non-standard variety: Categorizing vowels across speech styles in Glaswegian English

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Despite much research on the performance of distributional category learning models on Standard North American English (e.g. Feldman [2], deBoer and Kuhl [1], McMurray et al. [10], Vallabha et al. [16], and many others), statistical learning of vowel categories of other regional varieties remains vastly underaddressed in computational literature. This paper applies an unsupervised infinite mixture model (as developed in Feldman [2]) to vowels from a corpus of Glaswegian English sociolinguistic interviews. While originally developed for North American English vowels in carrier syllables devised by Hillenbrand et al. [4] to limit variation due to phonetic context, the distributional learner was also able to categorize vowels largely correctly across speech styles common to sociolinguistic interviews. This displays the ability of the distributional learner to operate relatively well on data with extensive overlap from running Glaswegian English speech, demonstrating that computational models of category acquisition can handle more complex inputs than minimal pair lists, and can be used with naturally-occurring speech from non-standard regional varieties.

10.3: Corpora and Databases

Thursday, August 13, 2015, 11:30-12:30, Alsh

Chair: Louis ten Bosch

Session 10.3, Paper 1 (11:30-11:45)

Generating a bilingual corpus for the investigation of L2 word stress

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Finding large numbers of target items for phonetic and

phonological experiments can be a painstaking task. Using freely available tools and data, we have generated a bilingual corpus with the specific aim of investigating the processing and perception of stress in second-language (L2) words. Normalized Levenshtein distances between orthographic and phonemic transcriptions of Brazilian Portuguese (BP) and American English (AmE) translation word pairs were used to automatically generate similar and dissimilar word pairs. Frequency data from corpora were used as a metric of familiarity. To test if these generated metrics correspond to speakers' intuitions, BP L1 speakers of AmE L2 rated the word pairs on orthographic and phonological similarity, and indicated their familiarity with the English words. Results showed a high correlation between subjective ratings and the computed similarity and familiarity values of the bilingual corpus. We conclude that automatically constructed bilingual corpora such as ours, combined with simple string similarity metrics, are a valid and useful tool for experimental research into L2 (word stress) acquisition.

Session 10.3, Paper 2 (11:45-12:00)

DIMA - Annotation guidelines for German intonation

Kügler, Frank; Smolibocki, Bernadett; Arnold, Denis; Baumann, Stefan; Braun, Bettina; Grice, Martine; Jannedy, Stefanie; Michalsky, Jan; Niebuhr, Oliver; Peters, Jörg; Ritter, Simon; Röhr, Christine T.; Schweitzer, Antje; Schweitzer, Katrin and Wagner, Petra

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This paper presents newly developed guidelines for prosodic annotation of German as a consensus system agreed upon by German intonologists. The DIMA system is rooted in the framework of autosegmental-metrical phonology. One important goal of the consensus is to make exchanging data between groups easier since German intonation is currently annotated according to different models. To this end, we aim to provide guidelines that are easy to learn. The guidelines were evaluated running an inter-annotator reliability study on three different speech styles (read speech, monologue and dialogue). The overall high κ between 0.76 and 0.89 (depending on the speech style) shows that the DIMA conventions can be applied successfully.

Session 10.3, Paper 3 (12:00-12:15)

The Qur'an Lexicon Project: A database of lexical statistics and phonotactic probabilities for 19,286 contextually and phonetically transcribed types in Qur'anic Arabic

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Reciting and memorizing the Qur'an forms a major part of religious practice for 1.6 billion Muslims around the world; in non-Arabic-speaking Muslim communities, it also provides Muslim speakers of other languages with their first exposure to the Arabic script and language. However, little research has been completed regarding the psycholinguistic processing of Qur'anic Arabic. In this paper, we present the first psycholinguistic database for Qur'anic Arabic, which comprises lexical variables (length: character, syllable, phone; frequency: item, syllable, biphone,

phone; lexical uniqueness point, orthographic and phonological neighbourhood sizes, and orthographic and phonological Levenshtein distances) as well as phonotactic probabilities (positional segment and biphone) for 19,286 types that we contextually and phonetically transcribed based on Qur'anic recitation. This open-source resource will be useful for researchers studying Qur'anic Arabic lexical and phonological processing as well as for making systematic cross-linguistic comparisons that allow better delineation of language-specific and language-general processes in language processing.

Session 10.3, Paper 4 (12:15-12:30)

Constructing a global cross-linguistic database of basic phonological properties: Principles and challenges

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There is an obvious interest in capturing general trends in the structure of phonological systems of the world's extant languages. These may hint at overall design properties of human language, which in turn may have origins in basic human cognitive properties or characteristics inherited from the earliest human language(s). One tool that can be used to study such trends is a broadly-based crosslinguistic database on phonological systems. Four of the principal challenges to providing this will be discussed in this paper, which describes the thinking behind the compilation of the LAPSyD database and draws some comparisons with other somewhat similar projects, such as PHOIBLE, SAPhon and Segér's African consonant inventory database.

10.4: Acoustics of Prominence

Thursday, August 13, 2015, 11:30-12:30, Dochart 1

Chair: Zofia Malisz

Session 10.4, Paper 1 (11:30-11:45)

The influence of prominence on the production of plosives in Italian

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This study explores prosodic strengthening in the production of fortis plosives in Italian as a function of four structural levels of prominence, reflecting differing focal conditions (in order of increasing prominence: postfocal, broad focus, narrow focus and contrastive narrow focus). The overall analysis indicated that for lingual consonants closure duration was the most important acoustic parameter, differing not only when comparing the most diverging levels, contrastive and postfocal, but also when comparing the broad focus and postfocal conditions. For the labial plosive, /p/, the parameter that was affected most by the level of prominence was burst energy. Unsurprisingly, given the lack of aspiration in the language, there was no consistent effect on VOT.

Session 10.4, Paper 2 (11:45-12:00)

Prosody of voice: Declination, sentence mode and interaction with prominence

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This paper looks at voice source correlates of declination. This follows a line of research that proposes that prosody is primarily signalled by the temporal modulation of the voice source, and not just F0. Inverse filtering and source parameterisation was carried out on twelve 3-accent sentences of Connemara Irish (Declaratives, WH questions and Yes/No questions). All have a falling intonation and a H* H* H*+L pattern. The measured voice source parameters indicate a declination of other aspects of the voice: a decline in the strength of the source excitation (EE), an increasingly lax phonation over the course of the sentence, as indicated by the decline in the closed quotient (CQ) and the normalised glottal frequency (RG). These indicators of 'source declination' were found across sentence modes. However, there appear to be source differences between the declaratives and the question sentences in terms of the overall levels of EE, CQ, RG and F0. The interaction with the accentuation pattern of the sentence is discussed.

Session 10.4, Paper 3 (12:00-12:15)

Accentual prominence and consonant lengthening and strengthening in Mawng

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In this paper we investigate the contribution of consonant duration to the signaling of accentual prominence in Mawng, a language spoken in Northern Australia. We compare consonants in VC sequences where the vowel is part of an accented or tonic syllable vs. non-tonic (non-prominent) VC sequences. We further analyse the contribution of vowel-consonant timing to prominence, through an analysis of VC ratios. Similar to other Australian Indigenous languages, post-tonic sonorant consonants show stronger prominence-related lengthening effects than accented vowels.

Session 10.4, Paper 4 (12:15-12:30)

The placement and acoustic realisation of primary and secondary stress in Indian English

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This study examined the acoustic correlates of primary and secondary stress in Indian English. Together with the patterns of lexical stress placement, the parameters of syllable duration, pitch slope, intensity and spectral balance were examined in six noun-verb pairs. Two L1 backgrounds (Hindi and Malayalam) were examined. Results showed that lexical stress placement varied substantially across the speakers, but was in the majority of cases on the same syllable as in American or British English. Second, speakers relied on (in order of importance) differences in intensity, spectral balance, duration, and pitch slope to distinguish primary from secondary stress. The results also showed that Indian English differs from other varieties in the phonetic realisation of the primary-secondary stress distinction.

10.5: Cochlear Implants

Thursday, August 13, 2015, 11:30-12:30, Dochart 2

Chair: Anja Kuschmann

Session 10.5, Paper 1 (11:30-11:45)

Speech of cochlear implant patients: An acoustic analysis of sibilant production

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The aim of this study was to analyse sibilant production of cochlear implant (CI) patients, comparing them with normal hearing speakers (NH). Because of the inhomogeneity of cochlear implant patients, in this study they were divided into four groups, depending on whether they are prelingually or postlingually deaf speakers and the period of time between the deafening and the implantation of a cochlear implant. Each group was compared with an age- and gender-matched control group consisting of normal hearing speakers. Measurements were made of the first spectral moment of /s/ and /ʃ/. The results showed significantly lower values for /s/ for all four CI groups compared to their associated control groups. /ʃ/ values were also lower for the CI speakers than for the hearing controls, but only significant for postlingually deaf speakers. The results are interpreted in terms of technical limitations of cochlear implants in higher frequency ranges and a possible adaptive strategy.

Session 10.5, Paper 2 (11:45-12:00)

Perception and interpretation of low-onset rising tunes by prelingually deaf cochlear implant users

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Production studies have shown that the intonational tunes L*H-H% and L*L-H% may be used for different discourse functions in Australian English [1,2,3,4]. This study investigates whether prelingually deaf cochlear implant (CI) users can discriminate between changes in the starting point of a rise, as distinguishes these tunes phonetically. We also assessed their interpretation of these tunes. 10 CI users and 19 NH listeners completed an AXB task where the alignment of the rise startpoint was varied in 50 milliscond steps, and the rise endpoint was either 10 or 19 semitones. The CI users could only discriminate between rises with at least 200 ms difference in rise startpoints, while the NH listeners only required 100 ms difference. Both groups most frequently interpreted the L*H-H% tunes as questions and the L*L-H% tunes as statements. For NH listeners, earlier rise startpoints were associated with more 'question' responses.

Session 10.5, Paper 3 (12:00-12:15)

Phonetic convergence and imitation of speech by cochlear implant patients

Scarbel, Lucie; Beautemps, Denis; Schwartz, Jean-Luc; Schmerber, Sébastien and Sato, Marc
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Speech communication can be viewed as an interactive process involving a functional coupling between sensory and

motor systems. One striking example comes from phonetic convergence, when speakers unconsciously tend to mimic their interlocutor's speech during communicative interaction. In order to test whether deaf people with cochlear implantation did recover such perceptuo-motor abilities, we measured online imitative changes on the fundamental frequency in relation to acoustic vowel targets in a non-interactive situation of communication during both unintentional and voluntary imitative production tasks. We showed that cochlear implanted participants have the ability to converge to an acoustic target, both intentionally and unintentionally, albeit with a lower degree than normal hearing participants. These results suggest that cochlear implanted patients recovered significant perceptuo-motor abilities less than two years following cochlear implantation.

Session 10.5, Paper 4 (12:15-12:30)

The production of word stress in babbles and early words: A comparison between normally hearing infants and infants with cochlear implants

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There is evidence that infants are able to manipulate cues to word stress as early as babbles. For children with cochlear implants (CI), word stress production may pose difficulties since the CI does not provide enough detail for adequate perception of f0 or intensity changes. This study is a longitudinal investigation of pitch, intensity and duration in disyllabic babbles and first words by normally hearing (NH) and children with CI. Both groups had smaller acoustic differences on babbles than on words, and children with CI made smaller differences in pitch and intensity than the NH group. A marked increase in acoustic differentiation was seen in the NH group on words, especially for pitch. Although there was a trend in the same direction in the CI group, the same shift was not observed in their lexical productions. Implications for language processing in this population and theories of language acquisition are considered.

10.6: Stops and Voice Onset Time

Thursday, August 13, 2015, 11:30-12:30, Carron 2

Chair: Gerry Docherty

Session 10.6, Paper 1 (11:30-11:45)

Durational correlates of singleton-geminate contrast in Hungarian voiceless stops

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This paper presents the results of a durational analysis of singleton and geminate stop consonants from Hungarian spontaneous speech. The durational correlates of three types of geminates (i.e. underlying, derived true and fake geminates) are also examined and compared to one another. Results show that single voiceless stops are realized with significantly shorter total and closure duration than geminates. Research findings on rates of closure phase suggest that phonological lengthening targets a certain portion of

the internal structure of stops. VOT seemed to be invariant and therefore an irrelevant parameter in the distinction of short and long consonants. We can evince differences among geminate types: fake geminates are produced with tentatively longer durations than underlying and true derived geminates; which result suggests closer similarity between the two latter types.

Session 10.6, Paper 2 (11:45-12:00)

Immediate phonetic interference in code-switching and interpreting

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VOT of English voiceless stops produced by L1dominant Czech-English bilinguals is examined in light of three hypotheses: (1) switching languages induces an immediate increase in L1 interference, (2) speakers experienced with switching languages show less immediate interference, and (3) interpreting induces greater interference than code-switching. Eighteen bilinguals, trained vs beginning interpreters, produced short sentences in a modified delayed repetition / translation task under three conditions: L2-only, code-switching into L2, and interpreting into L2. An effect of short-term L1 interference was observed: the speakers produced shorter, i.e. more L1-like, VOTs in code-switching and interpreting than in the L2-only condition, though the VOT reduction interacted with the place of articulation differently for speakers with more and less native-like VOTs. The effect was weaker for trained interpreters, giving some support to the second hypothesis. The type of bilingual task (code-switching vs interpreting) did not affect VOT.

Session 10.6, Paper 3 (12:00-12:15)

Closure durations in stops and grammatical encoding: On definite articles in Luxembourgish

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This paper examines the phonetic substance of the cliticised definite article in Luxembourgish, which generally renders as an alveolar lenis stop consonant, and how it relates to similar lexical alveolar stops and homorganic consonant clusters. It turns out that closure duration is the decisive acoustic feature: Compared with lexical stops, the clitic alveolar stop is realised with longer closure duration, which leads to a three-way distinction of alveolar stops.

Session 10.6, Paper 4 (12:15-12:30)

Temporal and spectral properties of Madurese stops

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Madurese is a language with a three-way laryngeal contrast and an unusual consonant-vowel co-occurrence restriction. We provide new data on the phonetic realisation of Madurese stops from a sample of 15 native speakers by examining VOT, f0 and two acoustic correlates of voice quality, H1*-H2* and H1*-A3*. Our data indicate that while f0 distinguishes voiced from voiceless (aspirated and unaspirated) stops, at least one voice quality measure contrasts voiced and voiceless aspirated stops with voiceless unaspirated stops, suggesting that the relationship between these features may be more complex than has previously been as-

sumed. Madurese appears to be best described as a 'register system' of the Mon-Khmer type, albeit one in which pitch and voice quality are dissociated.

10.7: Topics in Intonation I

Thursday, August 13, 2015, 11:30-12:30, Boisdale 2

Chair: Carlos Gussenhoven

Session 10.7, Paper 1 (11:30-11:45)

Functional difference between the two variants of rising-falling intonation in spontaneous Japanese monologue

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Penultimate non-lexical prominence, or PNLP, is a variant of rising-falling boundary pitch movement (L%HL%) in Tokyo Japanese. Analysis of the Corpus of Spontaneous Japanese revealed a hitherto unknown function of the PNLP. It occurred basically only once near the end of an utterance flanked by deep clause boundaries. This finding suggests strongly the interpretation that native speakers of Japanese use PNLP to predict the end of a long utterance. Pilot analysis was also conducted to examine the factors governing the occurrence of PNLP.

Session 10.7, Paper 2 (11:45-12:00)

F0 declination in Russian revisited

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This paper deals with F0 declination in Russian. The study was conducted using statistical data derived from the Corpus of Professionally Read Speech. The results confirm the relationship between F0 slope and the utterance length for Russian. At the same time they reveal a) individual strategies in pre-planning the declination slope of the phrase or utterance; b) strong dependency of the F0 slope on the intonation pattern of the utterance: thus complete final declaratives have steeper slopes than non-final units, at the same time as interrogatives (yes-no questions) with rising nuclear tone display no declination in the pre-nuclear part. These results support the idea that declination is linguistically controlled.

Session 10.7, Paper 3 (12:00-12:15)

Intonational rises and interaction structure in Sydney Aboriginal English

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Despite their ubiquity in intonational research, high rising terminal (HRT) intonation contours have not been investigated in Aboriginal varieties of Australian English. This paper investigates the form, alignment and use of declarative rises in the Aboriginal English spoken in Sydney. It is shown that Aboriginal speakers used five distinct types of declarative rises: high rises, low and high-range low-onset rises, and low and high-range fall-rises. Rises of the five categories were realised differently both with regard to alignment and f0 excursion. When tested against discourse context, the

rises were found to have longer trajectories in interactions with little competition for dominance, and shorter excursions when either participant was dominating the floor.

Session 10.7, Paper 4 (12:15-12:30)

Personality prediction based on intonation stylization

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This study's aim is to predict speaker personality traits from intonation patterns in spoken dialogs. Intonation patterns were extracted by a parametric superpositional stylization approach that allows for pattern description on a parametric as well as on a categorical level. Based on features derived from these representations we trained support vector machines and fitted generalized linear regression models to predict speaker personality with respect to the four dimensions of acting, extroversion, otherdirectedness, and sensitivity. The personality classification accuracies ranged from 79 to 91%.

ORAL SESSION 11

11.1: Talker Variation and Identification

Thursday, August 13, 2015, 14:00-15:00, Boisdale 1

Chair: Mary Beckman

Session 11.1, Paper 1 (14:00-14:15)

Extrinsic talker normalization alters self perception during speech

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In this study, we investigated the effects of changes in formant structure of externally presented speech signals on participants' auditory perception of their own speech output (i.e. feedback) during a word production task. The study involved a novel combination of two previously established research paradigms: (1) sensorimotor adaptation to altered auditory feedback during speech, and (2) extrinsic talker normalization of vowel perception through the presentation of carrier-phrases spoken with different formant patterns. The results suggest that the formant frequencies of a carrier-phrase presented immediately prior to word production serve as a frame of reference for the perception of selfgenerated speech outcomes, thereby influencing subsequent speech targets. This finding extends other recent evidence indicating that the auditory processing of speech sounds guiding speech production is highly flexible and adaptive under a range of different conditions.

Session 11.1, Paper 2 (14:15-14:30)

Rapid adaptation to target and background talker variation in speech-in-speech perception

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The present study examined the impact of talker variation in the target or background speech streams on speech-in-speech recognition. Listeners transcribed sentences in single-talker background babble at two signal-to-noise ratios in one of three conditions: 1) variable target talker and consistent masker talker; 2) consistent target talker and variable masker talker, or 3) consistent target and masker talkers. Results showed a significant effect of signal-to-noise ratio across conditions, as well as substantial variation across target-masker pairs within conditions 1) and 2). In contrast, overall performance across all trials in all conditions was stable, suggesting that the particular energetic masking characteristics of a given target-masker talker pair within a given condition override any potential impact from talker variability in the target or in the masker across conditions. Thus, when recognizing sentence-length stimuli embedded in background speech, listeners exhibit rapid adaptation to across-trial talker variation in the target or the background.

Session 11.1, Paper 3 (14:30-14:45)

The effects of talker variability on phonetic accommodation

*Babel, Molly and McGuire, Grant
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This paper compares spontaneous phonetic accommodation in high and low variability talker conditions. If multi-talker processing is a kind of increased cognitive load, we predict an increase in imitation in the low variability contexts. Our results suggest that, indeed, phonetic accommodation is greater in low variability contexts, but that this higher level of accommodation is moderated as perceptual experiences unfold in the task. That is, while phonetic accommodation in the low variability context stays relatively constant across the task, participants in the high variability context imitate less across the course of the experiment.

Session 11.1, Paper 4 (14:45-15:00)

Open-set identification of non-native talkers' language backgrounds

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Listeners are skilled at detecting native talkers of a language, but can they identify specific non-native language backgrounds? Open-set identification was used to explore this question. Eighty monolingual American English-speaking listeners labeled the language backgrounds of 30 talkers with 5 different native languages (L1s) on the basis of syllable-and word-length samples of English. As expected, listeners often identified L1 American English talkers correctly, despite hearing extremely short auditory stimuli. While listeners were sometimes unwilling to assign labels to L1 Korean, L1 Spanish, and to some extent L1 Mandarin talkers, L1 Hindi talkers were labeled frequently, and often the labels were correct. Responses revealed that listeners perceived many more language backgrounds than were actually represented by the talkers, a result which cannot be conveyed by the closed-set identification tasks commonly used. Impacts of listeners' perceptions of talker language background on cross-cultural communication are discussed.

11.2: Perception of Prominence

Thursday, August 13, 2015, 14:00-15:00, Carron 1

Chair: Petra Wagner

Session 11.2, Paper 1 (14:00-14:15)

On the prominence of accent in stress reversal

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We investigate the prominence of English words with stress reversal (e.g. élèvátion 2-1 → élèvàtion 1-2). We ask what motivates the occurrence of the “early high” (1-2) pattern outside of stress clash contexts, and consider the hypothesis that it marks prominence non-locally. Experiment 1 tests the effect of prominence pattern on memory. Given its markedness and location at phrasal onset, we hypothesize that early high pitch broadly facilitates recall for sentence information. This hypothesis is not confirmed, suggesting that the effect of pitch accent on memory may be restricted to the accented word. In Experiment 2 listeners perform a prominence-rating task on the same patterns. Results show that early high is prominence-lending, but with weaker prominence than the lexical (2-1) stress pattern. The combined findings suggest a hybrid function for early high in marking the beginning of a discourse-level prosodic unit, and in lending prominence to the early high-accented word.

Session 11.2, Paper 2 (14:15-14:30)

The perceptual prominence of pitch accent types in German

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The paper reports on a web-based perception experiment investigating the perceptual prominence of seven attested nuclear pitch accent types plus deaccentuation in German. Unlike previous studies which link prominence judgments of accents to aspects of intonational meaning, the present study directly asks for the perceived degree of prosodic prominence. Results reveal gradual differences between accent types, which can be defined along three tonal dimensions which have an impact on prominence perception: the direction of pitch movement (rises being more prominent than falls), the degree of pitch excursion (steeper excursion adding to the degree of prominence) and the height of the starred tone (high accents being more prominent than downstepped and low accents).

Session 11.2, Paper 3 (14:30-14:45)

Acoustic correlates of focus marking in Polish

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Languages vary in the types of contexts that affect prosodic prominence. This paper reports on a production study investigating how different types of foci influence prosody in Polish. The results show that focus and givenness in Polish are both marked prosodically, with pitch and intensity

as the main acoustic correlates. Polish patterns like English in showing prosodic focus marking in a broad range of contexts, and differs in this regard from Romance languages, despite the fact that aspects of the prosodic system of Polish are more similar to Romance. Finally, the results do not support the claim in [7, 8] that word prominence is shifted from the penultimate syllable to the initial syllable under focus.

Session 11.2, Paper 4 (14:45-15:00)

Prosodic and structural correlates of perceived prominence in Russian and Hindi

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Perceived prominence in Russian and Hindi, free word order languages, can be communicated prosodically and structurally, via word order. Paired production and perception experiments with native speakers show that discourse-prominent constituents are marked acoustically, via a perceptible increase in vowel intensity and f0, and structurally, via a change in word order and placing a word into a designated position in a sentence or clause.

11.3: Neurophonetics

Thursday, August 13, 2015, 14:00-15:00, Dochart 1

Chair: Fiona Gibbon

Session 11.3, Paper 1 (14:00-14:15)

The role of pre-SMA for time-critical speech perception – A transcranial magnetic stimulation (TMS) study

Dietrich, Susanne; Müller-Dahlhaus, Florian; Ziemann, Ulf; Ackermann, Hermann and Hertrich, Ingo

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The pre-supplementary motor area (pre-SMA) is engaged in speech comprehension under difficult circumstances such as poor acoustic signal quality, cognitive load, or time-critical conditions. Previous studies found the left pre-SMA activated when subjects listen to accelerated speech. Here we tested the functional role of the pre-SMA for accelerated speech comprehension by inducing a transient "virtual lesion" using continuous theta-burst stimulation (cTBS). Participants were tested (1) prior to (pre-baseline), (2) 10 min after (test condition for the cTBS effect), and (3) 60 min after stimulation (post-baseline) using a sentence repetition task (formant-synthesized at rates of 8, 10, 12, 14, and 16 syllables/s). Speech comprehension was quantified by the percentage of syllables in correctly reproduced words. For high speech rates, subjects showed decreased performance in the test conditions as compared to the baselines. This transient suppression of speech comprehension indicates that the pre-SMA contributes to time-critical encoding of phonetic-linguistic information.

Session 11.3, Paper 2 (14:15-14:30)

Asymmetries in the perception of Mandarin tones: Evidence from mismatch negativity

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While asymmetrical neural responses to segmental contrasts have been used to articulate theories of the featural representation of speech sounds, little is known about asymmetrical responses to suprasegmental phenomena. The present study tested the neural processing of Mandarin tones using a passive oddball paradigm. For both native Chinese speakers and naive speakers with no Chinese experience, Tone 3 (T3), which alternates with T2 in certain contexts, elicited asymmetrical mismatch negativity (MMN) effects. Specifically, when contrasting T3 and another tone (T2 or T4), a smaller MMN was elicited when T3 was the standard than when the other tone was the standard. On the other hand, no asymmetry was observed between T2 and T4, a pair that does not productively alternate. The results suggest that T3 standards have an underspecified lexical representation.

Session 11.3, Paper 3 (14:30-14:45)

Neural correlates of categorical linguistic and gradient paralinguistic intonation

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Multiple cues interact to signal multiple functions in intonation simultaneously which makes intonation notoriously complex to analyze. The Autosegmental-Metrical model for intonation analysis has proved to be an excellent vehicle for separating the components, but evidence for the phonetics/phonology dichotomy on which it hinges has proved elusive. Advocating a multidisciplinary approach, this paper presents ERP evidence that different types of intonational information – linguistic/phonological and paralinguistic/phonetic – recruit overlapping but distinct neural systems, which differ not only in their neural architecture, but also in the time-course of activation in the subcomponents of the systems. We argue that the findings can be accounted for in a model in which linguistic (phonological) intonation engages a language-specific frontotemporal system which is specialised for processing categorical linguistic information, while paralinguistic intonation, which reflects biological imperatives more directly, engages a distributed bilateral system which supports perceptual and cognitive processing more generally.

Session 11.3, Paper 4 (14:45-15:00)

Adult listeners' processing of indexical versus linguistic differences in a pre-attentive discrimination paradigm

Dadwani, Rozmin; Peter, Varghese; Chládková, Kateřina; Geambasu, Andreaa and Escudero, Paola

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The human ability to comprehend speech regardless of variation across speakers and accents has long puzzled researchers. Human listeners appear to employ separate mechanisms to cope with speaker versus accent variation. The present study uses event-related potentials (ERP) to test whether such different mechanisms exist at a pre-attentive level of speech processing. We assessed Australian English monolinguals' and bilinguals' perceptual sensitivity to four types of variation in vowels: namely, variation in speaker identity, gender, accent, and vowel category. Interestingly, listeners showed similar results regardless of their linguistic

background. As expected, listeners showed large sensitivity to accent changes. Rather surprisingly, however, they were more sensitive to changes in speaker gender than to changes in vowel category. These results are not in line with those of overt vowel classification but are explained by adults' sensitivity to large differences in voice quality when discriminating speech sounds.

11.4: Child Speech

Thursday, August 13, 2015, 14:00-15:00, Boisdale 2

Chair: Natalia Zharkova

Session 11.4, Paper 1 (14:00-14:15)

Phonetic reduction in spontaneous speech by children aged 9-14 years

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The aim of our study was to investigate whether children distinguish between 'new' and 'given' information via phonetic reduction in spontaneous speech in a similar way to adults. An interactive 'spot the difference' game was used to elicit spontaneous speech. Word duration, fundamental frequency and vowel formant frequencies in repeated content words relative to when they were mentioned for the first time were analysed in 96 children between 9-14 years of age. There were significant developmental changes in the three acoustic-phonetic parameters between children and adults. Children produced longer words, had higher median pitch and vowel formant values than adults. However, despite these differences in spontaneous speech between children and adults, we report that, by 9 years of age (and possibly earlier), children produce phonetic reduction to highlight 'new/given' information distinction in spontaneous speech dialogues in an adult-like manner.

Session 11.4, Paper 2 (14:15-14:30)

Emergence of the vowel space in very young children with Down syndrome: An exploratory case study

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The current study presents the preliminary results of an investigation into the development of the vowel space in one female child with Down syndrome (DS). Vowel productions at five points in time, ranging from 1;0 to 3;8 years of age, have been analysed to produce age-specific F1-F2 vowel plots and to calculate metrics quantifying changes in their size and dimensions. The results show that changes in DS vowel space area and shape are non-systematic, lacking the definite developmental trajectories present in the productions of typically developing children. An explanation of outcomes using the DIVA model of speech acquisition is proposed.

Session 11.4, Paper 3 (14:30-14:45)

Developmental change of vowel production in Cantonese children

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The paper investigates the developmental change in formant frequencies (F1F2) of the vowels [i u ε ɔ a] in Cantonese male and female children of ages ranging from 4 to 12. Results show that (i) a decrease in formant frequencies and vowel loop area is a function of age and the change is a gradual process; (ii) the developmental change with age is non-uniform across vowel types and formants, with a larger decrease in F1 for the mid and low vowels [ε ɔ a] than the high vowels [i u] and a smaller decrease in F2 for the rounded back vowels [u ɔ] than the unrounded front equivalents [i ε] and the low vowel [a]; (iii) the difference in vowel formant frequencies between male and female children starts at 7 years of age and peaks at 12 years of age; and (iv) the difference in vowel loop area between male and female children as a function of age is not significant.

Session 11.4, Paper 4 (14:45-15:00)

Variation in /s/ and the perceived gender typicality of children's speech

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Previous research has found an association between the acoustic characteristics of /s/ and judgments of the sex typicality of adult men's voices. The current study examined whether a similar association could be found when children's voices are used as stimuli. Two sets of productions were used, with either naturally produced /s/ tokens or tokens of /s/ produced by a trained phonetician. Listeners rated children to sound more girl-like if they produced /s/ with an especially high peak frequency, or with a diffuse spectrum suggesting a frontal misarticulation.

11.5: L2 Perception

Thursday, August 13, 2015, 14:00-15:00, Carron 2

Chair: Véronique Delvaux

Session 11.5, Paper 1 (14:00-14:15)

Intelligibility of British English accents in noise for second-language learners

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Standard or prestige accents (e.g. southern British RP, General American) are highly intelligible to a range of native speakers, which may be caused by listener experience (e.g. the accents are frequently heard in the media). The present study investigated the role of experience by testing Mandarin speakers with intermediate English proficiency in terms of their speech-in-noise recognition for a wide range of British English accents. The results demonstrated that Mandarin listeners were highly correlated with native British English listeners in terms of the relative intelligibility of individual talkers, with both groups finding standard accents to be more intelligible. It is thus plausible that the intelligibility of standard accents might be relatively independent from experience; standard accents may tend to have

acoustic-phonetic features that make them inherently more intelligible.

Session 11.5, Paper 2 (14:15-14:30)

Perception of English codas in various phonological and morphological contexts by Mandarin learners of English
Peretokina, Valeria; Best, Catherine; Tyler, Michael; Shaw, Jason A. and Di Biase, Bruno

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The present study aims to explore how phonological, morphological and prosodic features of an utterance affect perception of English codas by Mandarin listeners. A phoneme detection task was conducted with the word-final target phoneme /s/ appearing utterance-medially or finally in various phonological (consonant cluster vs. singleton) and morphological (plural morpheme vs. coda of a stem word) contexts. The results indicate that the patterns of second language (L2) perception of /s/ are influenced by the utterance position and phonological complexity of the coda and cannot be explained exclusively by presence or absence of plurality in Mandarin.

Session 11.5, Paper 3 (14:30-14:45)

Onset-coda asymmetry in second-language syllable perception by Japanese teachers of English

Yoneyama, Kiyoko and Tajima, Keiichi

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The paper reports the results of an experiment in second-language speech that provides further evidence for the view that syllable onsets and codas are asymmetric, and for the view that English proficiency affects Japanese listeners' speech perception performance. When two groups of Japanese listeners (Japanese college students and Japanese teachers of English) were asked to count syllables in spoken English words and nonwords, the performances of both groups declined as the number of consonants in the target item increased, but onsets led to a more drastic decline in performance than did codas. The results of Japanese teachers of English further revealed that upper-level English teachers performed the task significantly better than Japanese college students whereas lower-level English teachers did significantly worse. Among the three groups of participants, lower-level English teachers were the most strongly affected by phonological constraints on syllables in Japanese.

Session 11.5, Paper 4 (14:45-15:00)

Native French speakers' perception of the Japanese /h/: Ha piece hof cake?

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It is commonly observed that native French speakers tend to drop nonnative /h/-like phonemes, or to insert them where unexpected, in the "/h/ languages" they learn (e.g. English). The perception of the Japanese /h/ by French listeners was tested by way of an AXB discrimination task on non-words and a word identification task on Japanese minimal pairs. For naïve listeners not learning Japanese (N=9), the error rate in the discrimination task ranged from 0% to 12.5%; for elementary level learners of Japanese (N=8) the error rate in the identification task ranged from 0% to 8%. 12 errors out

of 17 in the latter task occurred when a less familiar word was identified as a more familiar one. These findings suggest that the French perception of the Japanese /h/ is not as difficult as other reported major difficulties in L2 acquisition, and that it interacts with lexical acquisition.

11.6: Rhotics

Thursday, August 13, 2015, 14:00-15:00, Dochart 2

Chair: Christoph Draxler

Session 11.6, Paper 1 (14:00-14:15)

Onset vs. coda asymmetry in the articulation of English /r/

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We describe an asymmetric categorical pattern of onset-coda allophony for English /r/, the post-alveolar rhotic approximant, drawing on published and unpublished information on over 100 child, teenage and adult speakers from prior studies. Around two thirds of the speakers exhibited allophonic variation that was subtle: onset and coda /r/ were typically both bunched (BB), or both tip-raised (RR), with minor within speaker differences. The other third had a more radical categorical allophonic pattern, using both R and B types. Such variable speakers had R onsets and B codas (RB): but the opposite pattern of allophony (BR) was extremely rare. This raises questions as to whether the asymmetry is accidental or motivated by models of syllable structure phonetic implementation.

Session 11.6, Paper 2 (14:15-14:30)

Diversity of tongue shapes for the American English rhotic liquid

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The American English rhotic liquid may be produced by a number of different tongue shapes. Using x-ray data of speakers from various regions of the United States, Delattre & Freeman [1] identified six basic tongue shapes used by speakers of "rhotic" dialects. It is unclear, however, whether different shapes are characteristic of particular dialect regions, or a matter of individual variation. In this study, we review findings from a number of published x-ray and MRI studies of tongue shapes for /ɹ/ using speakers from various dialect regions. In addition, we characterize the variability of tongue shapes used for /ɹ/ in a cineradiographic database of elderly men with normal speech from the area of Cincinnati, OH. Results show that variability in tongue shape prevalence is common across different regional populations. We conclude that tongue configuration is likely a matter of individual variation.

Session 11.6, Paper 3 (14:30-14:45)

An acoustic investigation of postvocalic /r/ variants in two sociolects of Glaswegian

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This paper presents a small-scale acoustic investigation into postvocalic /r/ in both middle class and working class varieties of the Glaswegian accent. Tokens of /CVC/ and /CVrC/ minimal pairs (e.g. hut/hurt, bead/beard) were elicited from two middle-class and two working-class speakers, and the formant frequencies throughout the V(r) portion were analysed. The results show significant differences in the formant patterns across both varieties and across vowel environments, for minimal pairs such as bead/beard and hut/hurt. The middle class minimal pairs are acoustically distinct throughout the V(r) portion; the working class hut and hurt pairs differ only at the end, and only in F2, potentially causing misperception for listeners. These results support previous work on /r/ in working class speech in Glasgow. The results also support previous work on the characteristics of higher formants in bunched tongue configurations of /r/.

11.7: Topics in Intonation II

Thursday, August 13, 2015, 14:00-15:00, Alsh

Chair: Rachid Ridouane

Session 11.7, Paper 1 (14:00-14:15)

In search of word accents in Estonian Swedish

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This study focuses on the word accent opposition in a lesser known and endangered variety of Swedish – Estonian Swedish. The variety has been described as not making the tonal distinction between Accent 1 and Accent 2 words, but no systematic acoustic phonetic investigation has been carried out previously to confirm these descriptions. As materials, disyllabic words from read sentences, spontaneous dialogues and elicited speech produced by nine elderly Estonian Swedish speakers were used. The comparison of tonal patterns of words with Accent 1 and Accent 2 showed that there is no consistent word accent opposition in this variety. However, some variation was found in the realisation of pitch contours in different speech styles, which might refer to possible traces of an earlier accent distinction.

Session 11.7, Paper 2 (14:15-14:30)

Variation in tone and gesture within language

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The present research focuses on the relation between tone and gesture across varieties of the same language, European Portuguese (EP). Three questions are addressed: (i) whether EP varieties use different visual cues while producing different sentence types/pragmatic meanings, (ii) if there is a relation between intonational variation and variability (if any) of visual cues, and (iii) if each linguistic factor involved can predict the type of visual cues used. Two sentence types (statements/yes-no questions) and pragmatic meanings (broad/narrow focus) were examined in four varieties of EP. Results show that visual

cues, like intonation, may vary across varieties and sentence types/pragmatic meanings. Furthermore, sentence type and pragmatic meaning are good predictors of how visual cues are time-aligned with intonation, in contrast with language variety. Consequently, we hypothesize that visual cues might play an important role in discriminating sentence types/pragmatic meanings, especially in the absence of tonal contrasts.

Session 11.7, Paper 3 (14:30-14:45)

Intonational schemas, perceived grouping, and distortions of perceived duration

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Perception of duration is known to be affected by a variety of contextual factors, including pitch. It has also long been observed that rhythmic grouping can affect perceived duration such that intervals between perceived groups are inflated in perception. Pitch and timing cues both play key roles in prosodic grouping. This paper explores the hypothesis that certain pitch-based distortions of time perception are in fact due to perceived grouping effects, and that such interactions can affect speech timing perception. A pair of perception experiments eliciting judgments of perceived grouping and perceived timing used the same set of stimuli, resynthesized with crossed continua of pitch and timing manipulations. Results support a correlation between perceived grouping and distortion of perceived duration of between-group silent intervals.

ORAL SESSION 12

12.1: Sociophonetics II

Thursday, August 13, 2015, 16:45-17:45, Boisdale 2

Chair: Sophie Holmes-Elliott

Session 12.1, Paper 1 (16:45-17:00)

Pre-aspiration and glottalisation in Manchester English

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The study focuses on the relationship between pre-aspiration and glottalisation in Manchester English. Analyses of five speakers aged 20-22 years indicate there is a prosodically conditioned complementary distribution: pre-aspiration is found word-medially (batter [pahtθə]), while glottalisation occurs word-finally (bat [paʔt]) in plosive contexts. In fricative contexts (e.g. mass), analysed for the word-final condition only, pre-aspiration is found obligatorily, and, if glottalisation occurs, it thus always co-occurs with pre-aspiration. The data have also shown lack of cues to the oral gesture in the acoustic signal for a number of plosives (glottal replacement/glottalling). This has been found for the fricatives as well, but very infrequently. The results furthermore suggest that unless glottal replacement and

glottal reinforcement are treated as manifestations of a single property at some level of representation, the relationship between glottalisation and pre-aspiration may be obscured, and analyses of glottalisation in accents of British English should therefore not be limited solely to glottal replacement ('glottalling').

Session 12.1, Paper 2 (17:00-17:15)

Affective attitudes towards Asians influence perception of Asian-accented vowels

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Previous studies have shown that speech perception can shift because of cognitive attitudes about the speaker, but little is known about affective attitudes in speech perception. In our study, we investigated how affective attitudes towards Asians relate to the perception of Asian-accented vowels by native Australian English listeners. Affective attitudes were assessed with an established scale from the social psychology literature adapted to our specific purpose. Vowel perception was assessed using a vowel categorization task. Results show that the degree of dislike towards Asians negatively correlates with listeners' accuracy in vowel categorization. The results also provide evidence that cognitive attitudes elicit affective attitudes, and suggest the appropriateness of using social psychological tools to explicitly evaluate the role of affective attitudes in speech perception.

Session 12.1, Paper 3 (17:15-17:30)

Sociophonetics of phonotactic phenomena in French

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The aim of this paper is to shed new light on the behaviour of 5 phonotactic phenomena in French, which have been shown to be rather sensitive to regional and/or stylistic variation: schwa deletion at the initial of polysyllabic words and in monosyllabic grammatical words, liaison, deletion of final postobstruent /l/ and /r/ and of /l/ in the 3rd personal clitic subject pronoun 'il'. The analysis is performed on a 13-hour speech corpus, labelled at different levels and including productions of 120 speakers originated from 3 French-speaking countries (Belgium, France and Switzerland) and recorded in two different tasks (reading and conversation). Beside the regional and stylistic variables, parameters such as speakers' age and socioeconomic status are also taken into account. The results of the analysis show that the 5 phenomena are mostly dependent on the speaking style, but that the effects of the other variables is less relevant than expected.

Session 12.1, Paper 4 (17:30-17:45)

The effect of listener and speaker gender on the perception of rises in AusE

Schmidt, Elaine; Post, Brechtje; Kung, Carmen; Yuen, Ivan and Demuth, Katherine

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Australian English (AusE) uses High Rising Tunes at the end of questions and statements. However, it remains unclear whether listeners can distinguish between them perceptually. This study analyses the identification of question-and

statement-rises in the absence of contextual information. Results suggest that identification is strongly influenced by speaker and listener gender. Specifically, it appears that male listeners use pitch differences in pitch accents for perceptual discrimination, just as they do in production, while female listeners rely on the speaker gender: female utterances are perceived as questions, male utterances as statements. Contrastingly, listener gender did not affect the interpretation of boundary tones: the highest tones are associated with questions, the lowest with statements. However, the middle step shows the bias for questions of female and statements of male speakers again. These results are important for L2 learners of AusE, and hearing impaired populations where subtle pitch differences are lost.

12.2: Speaker Recognition

Thursday, August 13, 2015, 16:45-17:45, Carron 1

Chair: Patti Adank

Session 12.2, Paper 1 (16:45-17:00)

Tracking the temporal relation between speaker recognition and processing of phonetic information

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To study the temporal relation between speaker recognition and the processing of phonetic information, we conducted a visual-world eyetracking study, in which speaker identification (two male voices) and word recognition (onset overlapping competitors) were assessed simultaneously by presenting speaker-item combinations as the visual referents. Results showed that participants could reliably identify speakers and items in all conditions. As for the temporal uptake of information and competition between visual referents of speakers and items, we found that across conditions speaker competition was stronger than phonetic competition. Only when both speaker and item referents were ambiguous, did phonetic competition manifest itself. This suggests that speaker information is processed rapidly such that phonetic competition can be minimised. We conclude that the visual-world paradigm can be further extended to study the interaction of different types of information in the speech signal.

Session 12.2, Paper 2 (17:00-17:15)

An fMRI study on forensic phonetic speaker recognition with blind and sighted listeners

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A forensic phonetic speaker recognition experiment with spontaneous speech samples of known and unknown speakers was carried out while listeners underwent a functional magnetic resonance imaging (fMRI) scan. In sighted participants, listening to familiar in contrast to unfamiliar speakers elicited brain activations in the right frontal pole and the left part of the cerebellum. When fMRI data of the first and the second 15 seconds of listening to familiar speakers were compared, it was found that auditory areas were significantly stronger activated in the first part, and visual ar-

eas showed stronger activations in the second part. In two blind participants, there were no brain activations which were stronger in the first compared to the second 15 seconds of listening to familiar speakers' voice samples. When the second part was compared to the first, also blind listeners showed stronger activations in visual areas.

Session 12.2, Paper 3 (17:15-17:30)

Effects of nasality and utterance length on the recognition of familiar speakers

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The present study examines the effects of nasality and utterance length on memory of familiar speakers using the technique of voice line-ups. With this technique, presented speakers have similar speech F0, dialect, and age range, and they utter the same material. Sets of voice line-ups were elaborated each containing 10 male voices (1 target "familiar" voice and 9 "filler" voices). In each set, speakers produced given utterances of four different lengths, with varying numbers of nasal sounds. Participants ($n = 44$) were selected on the basis of their familiarity with the target voice. They were asked to identify the familiar voice within line-ups. The results show that both utterance length and nasality positively influence voice recognition but these effects only begin after hearing four or more syllables. This suggests that speaker recognition requires a few syllables and may not operate as quickly as processes of visual recognition.

Session 12.2, Paper 4 (17:30-17:45)

The effects of speech perception and speech comprehension on talker identification

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Listeners identify talkers more accurately in their native language than an unknown, foreign language in a phenomenon called the language-familiarity effect. However, the psychological basis for this effect remains unknown. Some have suggested that the linguistic processes involved in speech perception and comprehension facilitate native-language talker identification. Others have argued that talker identification is independent of linguistic processing and that increased familiarity with statistical properties of speech acoustics is sufficient to produce this effect. We report two experiments investigating whether linguistic processes facilitate talker identification. Experiment 1 reveals that there is no native-language advantage for time-reversed speech, suggesting that acoustic factors do not explain the language-familiarity effect. Experiment 2 reveals that talker identification accuracy improves as a function of the linguistic content in speech, suggesting that both speech perception and comprehension contribute to talker identification. Together, these results demonstrate a true linguistic basis for the language-familiarity effect in talker identification.

12.3: Topics in Language Acquisition

Thursday, August 13, 2015, 16:45-17:45, Carron 2

Chair: Ben Munson

Session 12.3, Paper 1 (16:45-17:00)

Fixed temporal patterns in children's speech despite variable vowel durations

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The current study compared children's and adults' ability to produce inherent and context-specific vowel duration differences with their ability to repeatedly produce the same vowel in the same context. Children (5-and 8-year-olds) and adults produced real English words in a frame sentence multiple times. Mean vowel duration and variability in vowel duration were analysed as a function of the manipulated factors. Results were that children produced exactly the same contrasts as adults despite also exhibiting more variability in their production of individual vowels. The results are consistent with a model where the 'plan' is remembered relative timing information and execution is the achievement of motor goals at specified temporal intervals.

Session 12.3, Paper 2 (17:00-17:15)

VC timing acquisition: Integrating phonetics and phonology

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This paper examines how young children negotiate complex mappings between phonological structure and durational cues in their early productions, and explores how competition between multiple uses of temporal properties may influence the acquisition pathway. Findings suggest children switch priorities as they develop, possibly as a result of mastering a more complete range of phonetic devices.

Session 12.3, Paper 3 (17:15-17:30)

Do baby-talk words reflect biomechanical constraints on speech production?

*Skarabela, Barbora; Ota, Mitsuhiko; Fazekas, Judit and Wihlborg, Lovisa
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Baby-talk words are conventionalized lexical items used in infant-directed speech. According to the Frame/Content theory, the structure of baby-talk words reflects biomechanical constraints on speech production associated with the origin of speech, a hypothesis that yields three predictions — compared to adult vocabulary, baby-talk words should exhibit (1) more canonical CV syllables, (2) more intrasyllabic CV co-occurrence patterns that minimize tongue movement, and (3) a stronger preference for intersyllabic CVC patterns with labial-vowel-coronal, rather than coronal-vowel-labial, sequences. We tested these predictions in a corpus of 351 baby-talk words (e.g. choochoo) matched with their corresponding adult alternatives (e.g. train) in 10 languages. Although the results support the prediction

related to canonical CV syllables, they fail to confirm the two predictions related to intrasyllabic and intersyllabic segmental sequences. Baby-talk words do not appear to be any more compliant with the proposed biomechanical constraints than adult words, except in having more canonical CV syllables.

12.4: L2 Categories and Contrasts

Thursday, August 13, 2015, 16:45-17:45, Dochart 1

Chair: Juli Cebrian

Session 12.4, Paper 1 (16:45-17:00)

L1 allophones and L2 sound perception

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The bi-level input processing model posits two levels of speech sound processing. In this model, context-bound allophones are encoded separately at a lower level of processing. If this is the case, second language learners should exhibit some facilitation effect when perceiving non-native phonemes that are used as context-bound allophones in their first language. Using a cue-weighting design, the current study tested the hypothesis that Canadian French listeners should be able to apply their sensitivity to spectral changes in the high front tense-lax vowel allophones in their first language to perceive the high front tense-lax vowel phonemes in English. Our results demonstrate that most of the Canadian French listeners could perceive the English vowel contrast in a way similar to North American native English listeners. We further discuss possible explanations as to why some could not, and why a previous study with Spanish listeners did not demonstrate such facilitation effect.

Session 12.4, Paper 2 (17:00-17:15)

Can acoustic cues used in L1 really be used to perceive novel sound contrasts?

*Ikawa, Shiori; Takimoto, Kumi and Grenon, Izabelle
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One issue in language acquisition is whether the acoustic cues used in the L1 can be used to perceive a different phonemic contrast in the L2. A previous study found that Japanese listeners can utilize their sensitivity to vowel duration in their L1 to identify the English coda voicing contrast when asked to classify each token as 'bit' or 'bid'. That is, they could use vowel duration in a way comparable to native English listeners when tested with a lexical identification task. The current study tested whether Japanese listeners could still utilize vowel duration to identify the same contrast when using a phoneme identification task. Japanese listeners were asked to categorize the last sound they heard as 't' or 'd'. Our results indicate that Japanese listeners rely on vowel duration only in the lexical identification task: the familiar acoustic cues are not applied to the novel phonemic contrast.

Session 12.4, Paper 3 (17:15-17:30)

/u/-Fronting in English speakers' L1 but not in their L2

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This paper presents an acoustic analysis of the three corner vowels in the Diapix Foreign Language corpus (DIAPIX-FL) which contains material from English and Spanish native speakers from both their L1 and L2. We investigated how L1 vowel characteristics influence the production of L2 vowels, and to what extent a current sound change in one of the languages is reflected in the other. We find that /u/-fronting in English occurs for both native and nonnative speakers, although the degree of /u/-fronting is much larger for the English group. English speakers appear to create a separate category for the L2 /u/ rather than use their L1 sound. Spanish speakers show some adjustment to their English /u/ and /a/ realisations. These findings suggest that despite limited exposure to the L2 sounds, learners are aware of realisational differences between the languages and implement them to different degrees even for nonstandard variants.

Session 12.4, Paper 4 (17:30-17:45)

Production of a non-contrastive sound in a second language

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A speech production experiment was conducted to investigate how well native Japanese speakers can produce a non-contrastive sound in American English, namely, intervocalic alveolar flaps, and how their production varies as a function of language experience. Native Japanese speakers who have prior experience living in the US produced English sentences containing potentially flappable segments. Results showed that Japanese speakers produced alveolar flaps to varying degrees. Acoustic analysis revealed that flaps produced by Japanese speakers show properties that have previously been associated with them, such as short duration and continuous voicing. Results also showed that Japanese speakers produced alveolar flaps within words, e.g. letter, and in certain types of phrases, e.g. get on. Finally, speakers who frequently produced alveolar flaps tended to be those who arrived in the US early in their life, who stayed in the US for a long time period, and who had high scores on TOEFL iBT.

12.5: Perception of Second Language Prosody

Thursday, August 13, 2015, 16:45-17:45, Dochart 2

Chair: Satsuki Nakai

Session 12.5, Paper 1 (16:45-17:00)

Perceptual effects of deviance in pitch accent distributions in L1 and L2 Dutch

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This paper describes the effect of deviance in focus marking by means of pitch accent distributions in Dutch on L1 perceptions of accentedness, nativeness and comprehensibility in L1 and L2 speech. On a rating task Dutch natives demonstrate that they have unambiguous intuitions concerning L2 speech by Spanish learners of Dutch by categorically rating

it as more accented, more difficult to comprehend and less typical of an L1 speaker than L1 speech, with proficiency factor as a modulating factor. Interestingly, accentedness and nativeness are rated more extremely than comprehensibility, suggesting that non-native, foreign accented speech can still be highly comprehensible. A preference task reveals that Dutch natives prefer prosodically accurate utterances to prosodically inaccurate ones, when making nativeness judgments based on prosodic cues only, for both L1 and proficient L2 speakers.

Session 12.5, Paper 2 (17:00-17:15)

Normalization for speech rate in native and non-native speech

Bosker, Hans Rutger and Reinisch, Eva

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Speech perception involves a number of processes that deal with variation in the speech signal. One such process is normalization for speech rate: local temporal cues are perceived relative to the rate in the surrounding context. It is as yet unclear whether and how this perceptual effect interacts with higher level impressions of rate, such as a speaker's non-native identity. Non-native speakers typically speak more slowly than natives, an experience that listeners take into account when explicitly judging the rate of non-native speech. The present study investigated whether this is also reflected in implicit rate normalization. Results indicate that non-native speech is implicitly perceived as faster than temporally-matched native speech, suggesting that the additional cognitive load of listening to an accent speeds up rate perception. Therefore, rate perception in speech is not dependent on syllable durations alone but also on the ease of processing of the temporal signal.

Session 12.5, Paper 3 (17:15-17:30)

Effects of hearing an incorrect stress on word naming in Dutch by Francophones

Michaux, Marie-Catherine; Caspers, Johanneke; van Heuven, Vincent and Hiligsmann, Philippe

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In this paper, we investigate the effect of Dutch stress misplacements on the perception and subsequent production by Francophone learners of Dutch in a word naming task. The results suggest that Francophones experience a strong bias towards the final syllable when perceiving Dutch words and producing Dutch stress. Moreover, the results suggest that Francophones are less sensitive to mis-stressing than natives.

Session 12.5, Paper 4 (17:30-17:45)

Development of accentual categories in Japanese as a second language

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Previous research shows that Spanish speakers studying Japanese face significant difficulties when perceiving Japanese word accent contrasts, particularly between accented and unaccented words. We hypothesise that this is probably due to poorly developed accent categories in the target population. The results of a categorical perception test show great differences between native and non-native

listeners in both category definition and boundary positions. Results also show differences between categories, in that some are more clearly defined than others. This partly explains response biases reported in the literature.

12.6: Voice Quality

Thursday, August 13, 2015, 16:45-17:45, Alsh

Chair: John Esling

Session 12.6, Paper 1 (16:45-17:00)

Influence of suprasegmental features on perceived ethnicity of American politicians

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How accurate are listeners at identifying the ethnicities of political figures from one-word samples? Do suprasegmental variables provide a basis for these judgments? Tokens of six lexical items were extracted from speeches by seven male political figures of different stated ethnic identities. In a Mechanical Turk experiment, 94 listeners heard each token twice, then responded to the multiple-choice question: "What is the ethnicity of this speaker?". While listeners overall performed with an accuracy rate below chance, certain speakers and tokens were more consistently identified than others, both accurately and inaccurately. Analysis indicates suprasegmental features including Intensity Ratio, Harmonics to Noise Ratio, Jitter Average, Pitch Peak Ratio, and Sylable Duration Ratio contribute to listener judgments of ethnicity.

Session 12.6, Paper 2 (17:00-17:15)

Is the relative fundamental frequency an acoustic correlate of laryngeal tension in Portuguese speakers?

Jesus, Luis; Castilho, Sara and Hall, Andreia

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In this study the relative fundamental frequency (RFF) of healthy speakers (N=24) and speakers with voice disorders (vocal nodules N=9; Reinke's edema N=15) and its relation with laryngeal tension, were analysed. Ten VCV sequences from a phonetically balanced text were selected to calculate RFF values, and the vowel [a] was used to estimate the mean fundamental frequency, jitter, shimmer, and mean harmonics-noise-ratio. Strain was also perceptually assessed with the GRBAS scale. Analysis-of-variance was used to compare the RFF values from the three different groups but no statistically significant differences were found. There were, however statistically significant differences between the cycles. The RFF values within each group were widely dispersed. Contrary to what has been previously claimed in the literature it was not possible to establish a correlation between RFF and laryngeal tension, and it is hard to see the applicability of the RFF measure in a clinical context.

Session 12.6, Paper 3 (17:15-17:30)

Voice quality: A preliminary study on the phonetic distinctions of two Cantonese accents

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Hong Kong Cantonese and Guangzhou Cantonese are two fully mutually intelligible Chinese dialects that share almost the same phonological system. However, native speakers have no difficulty in distinguishing these two accents. The baffling question of what phonetic features account for the identification of these two Cantonese variants has perplexed many minds but remains unsolved. This study is a very preliminary foray aiming at solving this puzzle from a less studied linguistic domain, voice quality. Results of acoustic analyses reveal that there are significant differences in pitch and phonation of these two accents.

Session 12.6, Paper 4 (17:30-17:45)

Glottalization and timing at utterance final position in Hungarian: Reading aloud vs. spontaneous speech

*Markó, Alexandra and Kohári, Anna
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Speakers tend to mark boundaries of larger prosodic units with glottalization and the deceleration of articulation rate. In the present study, the final parts of Hungarian read and spontaneous utterances were analyzed in the temporal domain (compared to the other parts of the utterances) and in terms of glottalization. We investigated how glottalization and deceleration are related to each other in read and spontaneous speech in Hungarian. We also analyzed if these phenomena depend on the speech mode. Our results revealed a connection between glottalization and deceleration in spontaneous speech, whereas for read speech no such relation could be detected. Speech modes were also found to differ in the frequencies of the occurrence of glottalization and the magnitude of the deceleration in utterance final positions.

12.7: Corpora and Statistical Models

Thursday, August 13, 2015, 16:45-17:45, Boisdale 1

Chair: Simon King

Session 12.7, Paper 1 (16:45-17:00)

A statistical model for predicting pronunciation

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A general statistical model for the prediction of pronunciation given the orthographic transcript or the canonical pronunciation of a spoken utterance is described. The model is based on a Markov process that can be derived from a set of statistically weighted re-write rules. The automatic learning of such re-write rules based on annotated speech data is illustrated. One possible application of the pronunciation model is the automatic phonetic segmentation and labelling of speech by augmenting the Markov process with Hidden Markov Models for phonetic segments. A publicly accessible system using the model for the automatic phonetic segmentation and labelling of 14 different languages is presented.

Session 12.7, Paper 2 (17:00-17:15)

Bezier modelling and high accuracy curve fitting to capture hard palate variation

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The human hard palate shows between-subject variation that is known to influence articulatory strategies. In order to link such variation to human speech, we are conducting a cross-sectional MRI study on multiple populations. A model based on Bezier curves using only three parameters was fitted to hard palate MRI tracings using evolutionary computation. The fits produced consistently high yield accuracies. For future research, this new method may be used to classify our MRI data on ethnic origins using e.g. cluster analyses. Furthermore, we may integrate our model into three-dimensional representations of the vocal tract in order to investigate its effect on acoustics and cultural transmission.

Session 12.7, Paper 3 (17:15-17:30)

Assessment of sound laterality with the use of a multi-channel recorder

*Lorenc, Anita; Świącziński, Radosław and Król, Daniel
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Acoustic analysis of laterality in speech sounds poses numerous obstacles to researchers. Spectral characteristics of such segments vary depending on their phonetic context and shaping of the vocal tract [1]. There are no unambiguous acoustic parameters indicating that a sound is produced laterally. The main alternatives to spectrographic analysis in studying laterality are costly devices, such as electropalatographs (EPG) and magnetic resonance imaging (MRI) scanners. This article demonstrates how a much more affordable device, the multi-channel recorder, may be used in detecting and assessing laterality in speech. The system records multi-channel audio and calculates spatial coordinates of sound propagation sources, allowing the researcher to establish if the release is central, unilateral or bilateral. This method allows also for evaluating the dominance of the release on the left or right side. It may be used in assessing nasality, too.

Session 12.7, Paper 4 (17:30-17:45)

Speech technology as documentation for endangered language preservation: The case of Irish

*Ní Chasaide, Ailbhe; Ní Chiaráin, Neasa; Berthelsen, Harald; Wendler, Christoph and Murphy, Andrew
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Developing speech technology such as text-to-speech (TTS), requiring as it does a raft of phonetic and linguistic resources, can provide a powerful way to document endangered languages. Drawing on the experience of the ABAIR initiative, developing such resources for Irish [1], we illustrate how both the technology and the underpinning resources can be exploited in a variety of ways that can contribute to the preservation and revitalisation of these languages. By enabling new avenues of application, they can further help address the particular challenges that face the language users and learners. To maximise the immediate and downstream impact, resource development should ideally involve linguistically transparent, rule-based approaches, rather than the machine learning approaches typical of the commercially driven TTS systems for major world languages.

POSTER SESSION 4

Speech Perception II: Cross-linguistic Aspects

Thursday, August 13, 2015, 09:45-11:30

Paper P4.1 (Presenter at poster: 09:45-11:30)

Perception of Italian and Japanese singleton/geminate consonants by listeners from different backgrounds

*Tsukada, Kimiko; Cox, Felicity; Hajek, John and Hirata, Yukari
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We investigated if and how the use of one or multiple languages (bilingualism hereafter) affects the perception of intervocalic singleton/geminate consonants in Italian and Japanese. Two groups of non-native listeners (monolingual speakers of Australian English and bilingual speakers of Cantonese/English or Vietnamese/English) were examined. Two groups of native listeners (Italian and Japanese) residing in Australia acted as controls. Our aim was to test the hypothesis that the bilinguals process unfamiliar sounds more efficiently than the monolinguals due to their expanded phonetic inventories. Results showed that bilingualism did not result in superior performance overall. However, while the monolinguals identified consonant length in Italian slightly more accurately (albeit non-significantly) than in Japanese, the bilinguals showed the opposite pattern, i.e. greater accuracy with Japanese than with Italian. Generally, bilingual and monolingual non-native listeners misperceived geminates as singletons more often than they misperceived singletons as geminates in Japanese, but not in Italian.

Paper P4.2 (Presenter at poster: 09:45-11:30)

Perception of Arabic liquids by Japanese listeners

*Ooigawa, Tomohiko
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The present research aims to identify Japanese listeners' perception patterns of non-native liquid contrasts. The study examines Japanese listeners' perception of Arabic liquids (/l/, /r/, /ll/ and /rr/). Japanese listeners showed poor performance on the Arabic /l/-/r/ discrimination and very good performance on the discrimination of the other liquid contrasts (/l/-ll/, /ll/-rr/, /l/-rr/, /r/-rr/ and /r/-ll/). The listeners assimilated Arabic /l/ and /r/ to Japanese /r/, Arabic /ll/ to Japanese /rr/, and Arabic /rr/ to Japanese /r/. Of the four liquids, Arabic /l/ and /r/ were equally rated as closest to Japanese /r/, while Arabic /rr/ was rated as the least Japanese-like. The Arabic /ll/ stimuli were rated as intermediately close sounds between the singletons and /rr/.

Paper P4.3 (Presenter at poster: 09:45-11:30)

The processing of schwa reduced cognates and non-cognates in non-native listeners of English

*Mulder, Kimberley; Brekelmans, Gwen and Ernestus, Mirjam
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In speech, words are often reduced rather than fully pro-

nounced (e.g. /'səmri/ for /'sʌməri/, summary). Non-native listeners may have problems in processing these reduced forms, because they have encountered them less often. This paper addresses the question whether this also holds for highly proficient non-natives and for words with similar forms and meanings in the non-natives' mother tongue (i.e. cognates). In an English auditory lexical decision task, natives and highly proficient Dutch non-natives of English listened to cognates and non-cognates that were presented in full or without their post-stress schwa. The data show that highly proficient learners are affected by reduction as much as native speakers. Nevertheless, the two listener groups appear to process reduced forms differently, because non-natives produce more errors on reduced cognates than on non-cognates. While listening to reduced forms, non-natives appear to be hindered by the co-activated lexical representations of cognate forms in their native language.

Paper P4.4 (Presenter at poster: 09:45-11:30)

Individual differences in L2 learners' perceptual cue weighting patterns

*Kong, Eun Jong and Edwards, Jan
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This study investigated how English learners of Korean weigh multiple acoustic cues, namely VOT and f0, in perceiving the Korean stop laryngeal contrast. This question is of interest because VOT is more central to this contrast in English relative to Korean. Our goal was to examine whether L2 cue-weighting strategies were influenced by individual differences in cue-weighting strategies in L1 and by individual learner's L2 proficiency. The phoneme identification tasks [English /t/ vs. /d/; Korean /t/ vs. /th/] with 20 English learners showed that listeners who relied more on VOT in English relied less on f0 in Korean. Further, listeners who relied more on f0 in English in an ambiguous VOT condition also relied more on f0 in Korean. L2 proficiency was a significant predictor of both of these relationships. These results suggest that both attention to secondary cues in L1 and L2 proficiency influence cue-weighting strategies in L2.

Paper P4.5 (Presenter at poster: 09:45-11:30)

The perceptual assimilation of Danish monophthongs and diphthongs by monolingual Australian English speakers

*Faris, Mona; Best, Catherine and Tyler, Michael
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This study explores how experience with native language (L1) diphthongs influences the assimilation of non-native diphthongs. To obtain a comprehensive understanding of L1 attunement, native Australian English (AusE) speakers categorized and rated the Danish diphthongs, in addition to the monophthongs, in relation to their entire native vowel inventory. Short Danish vowels were assimilated to both lax and tense AusE vowels, and long Danish vowels were primarily categorized to tense AusE vowels. Only two of the Danish diphthongs were assimilated to an AusE diphthong, while the rest were either assimilated to an AusE tense vowel or were uncategorized. This suggests that the perceptual assimilation of non-native diphthongs is not based purely on sensitivity to vowel dynamics, but also on the per-

ceived phonetic similarity between non-native diphthongs and L1 vowels. Implications for modelling cross-language speech perception are discussed.

Paper P4.6 (Presenter at poster: 09:45-11:30)

Perception of lexical pitch-accent by Korean Learners of Japanese

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Tokyo Japanese has a lexical pitch-accent system whereas Seoul Korean features no word-level tonal representations. The present study investigated phonological perception of lexical pitch-accent by advanced Seoul Korean learners of Japanese, via sequence-recall experiments. The results, on the contrary to our prediction, showed that advanced Korean learners performed as well as native Japanese speakers in perceiving pitch-accent contrasts. Non-significant variance also suggested the advanced Korean learners in general have acquired lexical pitch-accent phonologically. The observations that Korean learners had no difficulties in the perception of pitch-accent were discussed with respect to acquisition models of non-native perception.

Paper P4.7 (Presenter at poster: 09:45-11:30)

The perception of English vowel contrasts by Chinese EFL learners and native English speakers

Zhang, Aihui; Feng, Hui; Zheng, Xinyuan; Xu, Zhihao and Dang, Jianwu

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Previous studies have shown that some English vowel contrasts remain difficult for English learners to perceive. This study investigated three potential factors affecting vowel perception: cross-language vowel systems, spectral distance, and language proficiency, for the discrimination and identification of English /i/-/ɛ/, /ɛ/-/æ/, /u/-/ʌ/, and /ʌ/-/ɒ/ contrasts in four groups of listeners: L1-Chinese with beginner level, low proficiency, and high proficiency in English, and L1-native English speakers. Eight 10-step vowel continua were used in the identification and AXB discrimination tasks. Results reveal that the disparity in the correctness in the discrimination task for L1-Chinese is higher than that for L1-native English speakers. No overall positive correlation is found between spectral distance and vowel discrimination, though positive correlation can be found in either front or back vowel contrasts when discussed separately. As language proficiency is enhanced, front vowels are perceived more categorically, while such a tendency is not shown in back vowel contrasts.

Paper P4.8 (Presenter at poster: 09:45-11:30)

Perception of Polish neutral and affective speech by native and non-native listeners

Klessa, Katarzyna; Oleśkowicz-Popiel, Magdalena and Owsiany, Mariusz

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In this paper a preliminary study of perceptual judgements of Polish dialogue utterances using a two-dimensional (activation-valence), continuous feature space is described. The speech material consists of utterances selected from a corpus of task oriented dialogues, realized before and after a (fake) negative evaluation of the speakers' performance.

The group of test participants includes: (1) native speakers of Polish, (2) participants of various countries of origin without any knowledge of the Polish language. The results show e.g. that the groups of participants tend to differ more in their opinions in the dimension of valence. An additional goal of the study was a verification of the perception test procedures and feature extraction techniques (with Annotation Pro tool) as regards their future applicability for a speaker identification and characterisation project.

Phonetic Psycholinguistics and Neurolinguistics II

Thursday, August 13, 2015, 09:45-11:30

Paper P4.9 (Presenter at poster: 09:45-11:30)

Phonological and lexical mismatch detection in 30-month-olds and adults measured by pupillometry

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This study shows for the first time that mispronunciation detection in 30-month-old children and adults can be measured using pupillometry. Compared to correctly pronounced words we found that mispronounced ones result in larger pupil dilations. For unrelated labels, which could either be a word or a non-word, we found different effects in children and adults. Children's pupillary responses for all unrelated labels were not different from those for correct labels whereas in adults we observed an increase in pupil size for unrelated words but not for non-words. Taking pupillary responses as an indicator of processing costs, we argue that for children as well as for adults a phonologically deviant word requires more resources to activate its matching entry in the mental lexicon compared to correctly pronounced words. Other measures like looking or reaction times are unable to capture this dimension in such a direct way.

Paper P4.10 (Presenter at poster: 09:45-11:30)

Schwa reduction in low-proficiency L2 speakers: Learning and generalization

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This paper investigated the learnability and generalizability of French schwa alternation by Dutch low-proficiency second language learners. We trained 40 participants on 24 new schwa words by exposing them equally often to the reduced and full forms of these words. We then assessed participants' accuracy and reaction times to these newly learnt words as well as 24 previously encountered schwa words with an auditory lexical decision task. Our results show learning of the new words in both forms. This suggests that lack of exposure is probably the main cause of learners' difficulties with reduced forms. Nevertheless, the full forms were slightly better recognized than the reduced ones, possibly due to phonetic and phonological properties of the reduced forms. We also observed no generalization to previously encountered words, suggesting that our participants stored both of the learnt word forms and did not create a rule that applies to all schwa words.

Paper P4.11 (Presenter at poster: 09:45-11:30)

Probabilistic reduction in reading aloud: A comparison of younger and older adults

*Moers, Cornelia; Janse, Esther and Meyer, Antje
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Frequent and predictable words are generally pronounced with less effort and are therefore acoustically more reduced than less frequent or unpredictable words. Local predictability can be operationalised by Transitional Probability (TP), which indicates how likely a word is to occur given its immediate context. We investigated whether and how probabilistic reduction effects on word durations change with adult age when reading aloud content words embedded in sentences. The results showed equally large frequency effects on verb and noun durations for both younger (Mage = 20 years) and older (Mage = 68 years) adults. Backward TP also affected word duration for younger and older adults alike. ForwardTP, however, had no significant effect on word duration in either age group. Our results resemble earlier findings of more robust BackwardTP effects compared to ForwardTP effects. Furthermore, unlike often reported decline in predictive processing with aging, probabilistic reduction effects remain stable across adulthood.

Paper P4.12 (Presenter at poster: 09:45-11:30)

Pitch, perceived duration and auditory biases: Comparison among languages

*Šimko, Juraj; Aalto, Daniel; Vainio, Martti; Lippus, Pärtel and Włodarczak, Marcin
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In addition to fundamental frequency height, its movement is also generally assumed to lengthen the perceived duration of syllable-like sounds. The lengthening effect has been observed for some languages (US English, French, Swiss German, Japanese) but reported to be absent for another (Thai, Latin American Spanish, German). In this work, native speakers of Estonian, Finnish, Mandarin and Swedish performed a two-alternative forced choice duration discrimination experiment with pairs of complex tones varying in several acoustic dimensions. According to a logistic regression analysis, the duration judgements are affected by intensity, f0 level, and f0 movement for all languages, but the strength of these influences varies across languages and a pattern revealed by the relative strengths correlates with phonological properties of the languages. The findings are discussed in the light of current hypotheses of the origin of pitch modulation of perceived duration.

Paper P4.13 (Presenter at poster: 09:45-11:30)

Factors affecting utterance-final vowel devoicing in spontaneous Japanese

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Investigation of spontaneous speech corpora has shown that vowel devoicing in Japanese is a statistical phenomena. However, factors behind vowel devoicing have not been fully studied. In addition, there have been no studies that specifically examined pre-pausal vowel devoicing. In this paper, we investigate vowel devoicing in the pre-pausal position, in particular, vowel devoicing occurring at the utterance-final position, using a corpus of spontaneous Japanese. We

first show overall devoicing rates of morae appearing at the phrase-final, prepausal position, and illustrate that they are attributed to a small set of frequent lexical items. We then examine some factors that may affect the probability of vowel devoicing, focusing on some lexical items typically appearing at the utterance-final position. The results suggest that utterance-final vowel devoicing is influenced by final lengthening and the speaker's cognitive load.

Paper P4.14 (Presenter at poster: 09:45-11:30)

How phonological context affects comprehension: The case of assimilated nasals and stops

*Mohaghegh, Mercedeh and Chambers, Craig
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Four forced-choice identification tasks examined the recognition of words containing sounds that have undergone the process of nasal place assimilation ('phone box': /n/→[m]) or stop place assimilation ('cat box': /t/→[p]). Identification scores and response times were measured for words ending in unassimilated or assimilated coronal consonants, which were either presented in isolation or within a carrier sentence that provided the triggering phonological context for place assimilation (i.e. where the word-final coronal consonant is followed by a word-initial labial sound). Identification scores showed that the presence of the context had a positive influence on listeners' correct identification of the assimilated forms. Furthermore, this effect was comparable across nasal and stop consonants. However, response time measures showed that phonological context speeded the recognition of assimilated nasals but not assimilated stops. This finding is consistent with the idea that compensation for assimilation involves distinct processing mechanisms for nasals versus stop consonants.

Paper P4.15 (Presenter at poster: 09:45-11:30)

Early Ganong effects

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In the first of two experiments measuring Ganong effects, listeners were permitted to respond when they wished, while in the second, they were prompted to respond within a short interval at varying delays after stimulus onset. Both showed that lexical items were activated early and that their activation strength grew with response time and persisted after the effects of the stimuli's acoustics began to fade. These results show that Ganong effects are not produced by late decision processes.

Paper P4.16 (Presenter at poster: 09:45-11:30)

Perceiving and adapting to regional accent differences among vowel subsystems

*Best, Catherine; Shaw, Jason A.; Mulak, Karen E.; Docherty, Gerard; Evans, Bronwen G.; Foulkes, Paul; Hay, Jennifer; Al-Tamimi, Jalal; Mair, Katharine and Wood, Sophie
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Listeners perceptually assimilate nonnative phones to native phonemes, but do they do so with unfamiliar accents of their own language? We assessed Australian (Aus) listeners' assimilation of vowels in two unfamiliar English accents, and whether prior short-term exposure to the other accent

would yield any adaptation to its vowels. Participants categorized the vowels of nonce words spoken in Aus or one of the unfamiliar accents (London [Lon]; Yorkshire [Yks]), after first hearing a story told round-robin by multiple speakers of Aus or of the other accent. Here we address six vowels with differing assimilation predictions for Lon vs. Yks. Results indicate that perceptual assimilation does contribute to perception of vowel variation, and that brief exposure to an unfamiliar accent can yield some degree of adaptation to its vowels.

Paper P4.17 (Presenter at poster: 09:45-11:30)
Changes in speech and breathing rate while speaking and biking

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Speech communication is embedded in many daily activities. In this paper we investigate the effect of biking on respiratory and speech parameters. Breathing and speech production were recorded in eleven subjects while speaking alone and while speaking and biking with different rates. Breathing frequency, speaking rate, speech and pause intervals, overall intensity and f0 were analyzed for the different tasks. It was hypothesized that cyclical motion increases breathing frequency, which leads to a restructuring of speech and pause intervals or an increase in speech rate. Our results generally confirm these predictions and are of relevance for applied sciences.

Paper P4.18 (Presenter at poster: 09:45-11:30)
Direction of priming and phonetic prototypicality in VOT specificity effects

*Ho, Danyuan and German, James Sneed
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While previous studies have observed that the specificity effect of voice-onset time (VOT) is mediated by VOT length [1], the role of the direction of mismatch at prime versus test has not been directly explored. This study addresses this issue through a long-term repetition priming experiment that simultaneously manipulated both VOT length at test (unmodified vs. reduced) and the VOT match status (matched vs. mismatched). The results show that having an unmodified VOT and matching the VOT of the study prime were both significantly correlated with shorter reaction times at test, though unmodified VOTs were identified faster overall regardless of match status. These findings corroborate the importance of the role played by fine-grained phonetic information in word representations, and we argue that the dominance of VOT length can be explained if the malleability of word-level representations depends on the density of speech experiences across the phonetic space.

Clinical Phonetics II

Thursday, August 13, 2015, 09:45-11:30

Paper P4.19 (Presenter at poster: 09:45-11:30)
Characteristics of speech following facial transplantation

*Perry, Bridget; Pomahac, Bohdan; Bueno, Ericka; Su, Pamela;
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To date, over thirty face transplants have been performed worldwide since 2005. Although advances in facial transplantation surgery now offer the possibility of societal reintegration to persons who suffer from severe facial disfigurement, speech deficits can persist. This paper reports on the speech characteristics of five patients following facial transplantation and relates them to labial strength and overall quality of life.

Paper P4.20 (Presenter at poster: 09:45-11:30)
Dysphonia is beautiful: A perceptual and acoustic analysis of vocal roughness

*Barkat-Defradas, Melissa; Fauth, Camille; Didirkova, Ivana;
de la Bretèque, Benoit Amy; Hirsch, Fabrice; Dodane, Christelle and Sauvage, Jérémie
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Researchers as well as speech therapists are interested in the determination of reliable acoustic cues that may be useful for the evaluation of vocal quality as well as for the diagnosis of vocal pathologies and remediation. In this way, experimental phonetics can be useful to clinical practice. This work which tries to connect phonetics and logopedic science, deals with the esthetic quality of dysphonic voices. The aim of this work is to evaluate if women can judge as attractive some masculine voices in spite of their pathological dimension. The results show that voices that are slightly rough (i.e. R1 on the GRBAS scale) are evaluated as the most attractive among a set of dysphonic and non-dysphonic voices. An acoustic study was carried out to quantify the acoustic characteristics of each type of pathological voice and to examine the acoustic correlates of voices that were perceived as the most attractive.

Paper P4.21 (Presenter at poster: 09:45-11:30)
Discrimination of emotional and linguistic prosody with cochlear implant simulations

*van de Velde, Daan J.; Khoshchin, Arian; ter Beek, Linda;
Schiller, Niels O.; Frijns, Johan H. M. and Briaire, Jeroen J.
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In cochlear implants (CI), temporal sound features are more successfully transmitted than spectral sound features. This could have consequences for the perception of prosody. This was tested for emotion vs. focus perception in simulated CI hearing, starting from the assumption that for emotional prosody spectral (F0) features are more important than for focus prosody. Sets of short Dutch phrases were recorded with neutral, emotional (happy and sad) and focused (e.g., 'a BLUE ball' vs. 'a blue BALL') prosody. Temporal or spectral prosody, or both, were cross-spliced from the non-neutral to the neutral utterances, thus controlling for the usable phonetic cues. 17 Dutch subjects identified intended emotions and focus for vocoded (CI-simulated) and unvocoded versions of the phrases. A benefit of F0 vs. temporal information was found for emotional, but not for focus prosody. This could imply that CI users have more trouble hearing emotional than linguistic (focus) prosody.

Paper P4.22 (Presenter at poster: 09:45-11:30)

Exploring duration and isochrony in nursery rhyme reciting for children with language impairments and typically developing children

*Georgiadou, Ioanna; Knight, Rachael-Anne and Dipper, Lucy
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Previous research shows that children with language impairments (LI) are significantly less rhythmic during motor tasks than typically developing children who are chronologically and linguistically age-matched. This study aims to explore a speech rhythm task and to shed new light on the rhythmic abilities of children with LI. Specifically, the authors investigate whether children with LI are impaired during speech rhythm production in nursery rhyme reciting in a) an internally-generated rhythm task, b) a rhythmic copying task, c) a paced rhythmic entrainment task and d) an unpaced rhythmic entrainment task. Children with LI were found to be impaired in the internally-generated rhythm and copying tasks. However, they performed equally well as controls during nursery rhyme entrainment tasks (both paced and unpaced). Results are discussed as they relate to possible clinical implications for children with LI.

Paper P4.23 (Presenter at poster: 09:45-11:30)
A longitudinal study of speech feature contrast production in children with cochlear implants

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This study examined changes in production of speech features by children with cochlear implants over a one-year period. Sixteen children (Mean age = 4, Range 3;2 to 5;11) with a mean of 32 months' experience with their implants and no additional disabilities served as participants. The children were asked to name a series of pictures designed to elicit production of the following speech characteristics: Vowel Height, Vowel Place, Consonant Place (Front and Back contrasts), Continuance and Consonant Voicing. Children were evaluated at both a baseline date, and approximately one year later. The results reveal that while all children appeared able to produce the range of vowel features, a number of younger children, particularly those under 4 years of age, experienced difficulty producing the consonant features. One year later nearly all children showed increased accuracy, although some children continued to show lower accuracy producing Back Place and Continuance feature contrasts.

Paper P4.24 (Presenter at poster: 09:45-11:30)
Detecting errors in American English /ɹ/ along a normalized acoustic threshold

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Perception of speech sounds has been characterized as largely categorical, such that listeners experience a shift in perception from one sound to a different sound at a certain point on a continuum. Children with speech errors, however, have been found to have atypical category boundaries. Following an observation by Hagiwara [6], who noted that typical speakers show third formant (F3) values for /ɹ/ between 80% and 60% of their average vowel F3, Hamilton et al [7] found that this value replicates a categorical bound-

ary for /ɹ/ for adult listeners: Productions above and below the 80% threshold sounded consistently "incorrect" or "correct", but productions closest to the threshold were given more ambiguous judgments. In this study, we apply this notion of an F3 threshold to investigate whether children with residual sound errors (RSE) respond like expert adult listeners (speech-language pathologists) when presented with natural-speech stimuli along a continuum of F3 distances.

Paper P4.25 (Presenter at poster: 09:45-11:30)
Prosodic expression of contrast in Williams syndrome
*Ito, Kiwako and Martens, Marilee
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Williams syndrome (WS) is a unique genetic developmental disorder characterized by excessive social behaviour accompanied by exaggerated prosody. While past studies with off-line assessment of prosodic skills report significant delays in prosodic skills in individuals with WS as compared to typically developing controls, reports typically lack speech analysis. The current study, using a speech elicitation task, tests whether individuals with WS can express contrast with prosody and what phonetic cues they produce to signal contrast. The data from 10 WS and 10 chronological-age (CA) matched control participants demonstrate striking similarities in their use of duration and intensity to express contrast. However, F0 did not systematically mark contrast in the WS group. The present data confirm the sensitivity to words' discourse status and the ability to mark contrast in WS, and suggest that the past low ratings of prosodic skills in WS may reflect the lack of reliable F0 cues.

Speech Production and Articulation III: Syllabic and Prosodic Aspects

Thursday, August 13, 2015, 09:45-11:30

Paper P4.26 (Presenter at poster: 09:45-11:30)

Temporal interactions of stems, suffixes, and the number of syllables of the words in Hungarian spontaneous speech

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This paper focuses on the internal temporal structure of polysyllabic and polymorphemic Hungarian words produced in spontaneous speech. We assumed that the increasing number of syllables in the words would result in the shortening of stem durations. However, no such changes are expected concerning suffix durations. Results confirmed these assumptions: the stem durations showed systematic linear changes while suffix durations were kept stable. The findings can be explained primarily by the marked status of the suffixes in Hungarian, and might reflect the speaker's intention to facilitate the processing of grammatical and syntactic agreement information for the listener.

Paper P4.27 (Presenter at poster: 09:45-11:30)
Changes in segmental timing in slow and fast metronome-synchronized speech

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Temporal characteristics of individual segments are affected by various global and local factors, such as tempo, syllable structure or position of a segment within the word. This has been shown for many languages, but since the general trends may be language specific, the present study investigates such effects for Czech. The material included 28 natural phonotactically complex words spoken by 24 subjects in synchrony with metronome beats at two different tempi. The lexical units were carefully selected with regard to their phonological structure. The results demonstrate interactions of tempo with the effects of final lengthening, segment type and onset complexity, suggesting non-linearity in the temporal changes.

Paper P4.28 (Presenter at poster: 09:45-11:30)

Reduction of unstressed central and back vowels in Contemporary Standard Bulgarian

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This paper reports two experiments that examine unstressed vowel reduction and neutralisation in Contemporary Standard Bulgarian. Stress-dependent F1 and F2 frequency variation was measured for the central and back vowel pairs in careful speech. The results reveal a less unequivocal picture of the pair-wise convergence of formant frequencies than has previously been reported: the data confirm a high degree of acoustic overlap only for the unstressed back vowels, /ɔ - u/, whereas the differences in the unstressed central vowels, /a - ə/, remain statistically significant. A perception experiment consisting of an identification and a discrimination task was designed to test whether the existing differences in unstressed vowels are perceptually significant. The correct-response rates in both tasks were not significantly higher than chance. This partial mismatch between acoustic and perceptual data points to incomplete, rather than categorical neutralisation.

Paper P4.29 (Presenter at poster: 09:45-11:30)

Bridging articulation and perception: The C/D model and contrastive emphasis

Erickson, Donna; Kim, Jangwon; Kawahara, Shigeto; Wilson, Ian; Menezes, Caroline; Suemitsu, Atsuo and Moore, Jeff

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This paper compares prominence that listeners perceive with actual articulatory prominence. We calculated phrasal boundaries from articulatory patterns using an algorithm of the C/D model, and compared those calculated boundaries with perceived boundaries. The jaw displacements, measures of prominence, were measured using EMA; articulatory boundaries were derived from a C/D model algorithm. The data is a set of English sentences that vary in the placement of contrastive emphasis. Perception data were obtained from listeners who were asked to evaluate syllable prominence and syllable boundaries for these sentences. The results indicate that perception of syllable prominence shows strong correlations with articulatory prominence, showing that jaw displacement can be a strong perceptual cue for syllable prominence. Further, perception of syllable prominence is also correlated with algorithmically-calculated articulatory syllable boundaries. These results

encourage us to explore the relation between articulation and perception of language prosody in terms of the C/D model framework.

Paper P4.30 (Presenter at poster: 09:45-11:30)

Temporal organization of off-glides in American English

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This paper tests the hypothesis that offglides /j/ and /w/ are best analyzed as a syllable coda through examining the temporal organization of offglide gestures within a syllable. Kinematic data were collected from four American English speakers using realtime MRI. The gesture timing of offglides was compared in singleton and complex coda contexts to determine whether offglides exhibit local gestural coordination with the preceding vowel, as would have been predicted by the non-competitive coordination model hypothesized for complex coda. Results show a temporal shift of the offglides when other coda consonants are present, suggesting a different coordination relationship for offglides in English. Accordingly, we propose a unique gestural organization that involves competitive coupling to account for the current findings, which captures both the findings and their dual phonological nature.

Paper P4.31 (Presenter at poster: 09:45-11:30)

A pilot study: Acoustic and articulatory data on tonal alignment in Swedish word accents

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This pilot study compares the timing of articulatory gestures to the timing of the tonal contour in South Swedish Accent 1 and Accent 2. Acoustic and articulatory data were collected with an EMA (Carstens AG501). Variables included the tonal alignment of the high tone H and the following low tone L to the vowel onset, the syllable offset, as well as to the lip aperture and the tongue body. Acoustic results point towards different units as host for the accents: Accent 1 aligns with the vowel while Accent 2 aligns with the syllable. The articulatory data shows alignment to different gestures: a stable tonal alignment with the lip aperture in Accent 1, and a less stable alignment with the movement of the tongue body in Accent 2.

Paper P4.32 (Presenter at poster: 09:45-11:30)

Gestural reduction of Hong Kong Cantonese syllable-final oral stops

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Previous work on Cantonese unreleased syllable-final stops has shown that these sounds are cued primarily by their spectral transitions during the preceding vowel (Khouw & Ciocca, 2006). However, it remains unclear whether speakers have lost a place distinction between such sounds. This study investigates the articulation of syllable-final /t, k/ that precede consonants differing by place (labial, alveolar, velar), which could result in varying degrees of gestural reduction. Productions of disyllabic Cantonese words by five speakers were recorded using ultrasonic tongue imaging and analyzed for lingual contour and minimal lingual aperture. Results for all but one speaker show systematic pat-

terns of reduction of the anterior or posterior constrictions for /t, k/ according to the place of the following consonant. Unexpectedly, the prelabial contexts elicited the most gestural reduction and deletion/assimilation, despite the fact that this context should have permitted the greatest amount of simultaneity and coarticulation.

Paper P4.33 (Presenter at poster: 09:45-11:30)
Prominence enhances voicelessness and not place distinction in English voiceless sibilants

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Prominence and prosodic strengthening make (at least some) segmental articulations more extreme, potentially enhancing acoustic contrasts. Here we found that prominence alone does not modulate the acoustic distinctiveness of the English sibilant place (/s/ vs. /ʃ/) contrast, although speakers can produce the sibilants more distinctively when contrasting with a minimal pair. Furthermore, we found evidence that sibilants at the end of prominent syllables were produced with an earlier glottal opening gesture. This produced more breathiness in the vowel and often an [h]-like segment between the vowel and the sibilant. This is consistent with the observation that prominence increases the glottal opening gestures as has been previously observed for prosodic strengthening of initial voiceless stops. Here we extend this observation to sibilants as well as codas of prominent syllables. Our results also suggest that prominence modulates gestural constrictions and not acoustic contrasts directly.

Paper P4.34 (Presenter at poster: 09:45-11:30)
The contribution of vowel coarticulation and prosodic weakening in initial and final fricatives to sound change

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This paper is concerned with the influence of vocalic context (/i, u/) and prosodic weakening on the production of the German fricatives /s, f/ in two syllable positions and its relation to the frequent sound change from alveolar to post-alveolar fricatives. Previous studies reported coarticulatory influences of vowel context on fricatives and more coarticulation in prosodically weak positions. However, the influence of syllable position is unclear, even though sound change affects more often segments in coda than in onset position. In order to test these factors, acoustic and articulatory data from six German speakers were analysed. They produced lexical words with fricatives in onsets and codas of stressed syllables in accented and deaccented words. The results show a small influence of syllable position on the analysed acoustic and articulatory measurements, with higher spectral centers of gravity and more retracted mean tongue trajectories in coda position.

Sociophonetics II: Suprasegmentals

Thursday, August 13, 2015, 09:45-11:30

Paper P4.35 (Presenter at poster: 09:45-11:30)

Gender differences in the prosody of German questions

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Based on enacted dialogues of 60 native speakers, the present study shows that males and females differ in their prosodic realization of lexically and syntactically marked questions in German. Frequency counts of final rises and falls, as well as measurements of mean F0, speaking rate, and intensity levels suggest that males rather than females are more polite, open, and amenable – i.e. overall more hearer oriented – when asking questions. This applies most clearly to syntactically marked questions, i.e. when male speakers ask their dialogue partner to make decisions or confirm pieces of information. Female speakers show signs of hearer orientation in wh-questions, i.e. when it comes to requesting explanations or justifications from the dialogue partner.

Paper P4.36 (Presenter at poster: 09:45-11:30)
Influences of language contact and linguistic experience on the production of lexical stress in Welsh and Welsh English

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This paper presents preliminary findings of an investigation into the realisation of lexical stress in monolingual and bilingual male adolescents from a community in West Wales. Monolingual speakers of Welsh English were compared with bilinguals from Welsh-speaking and English-speaking homes. This allowed us to explore the effects of language contact and individual linguistic experience on the realisation of lexical stress in Welsh and Welsh English. Results showed that stressed vowels are shorter, post-stress consonants and unstressed vowels are longer, and the F0 difference between stressed and unstressed syllables is smaller in Welsh than in English. Linguistic experience was found to affect the realisation of acoustic stress correlates differently. While no effect was found for any of the durational correlates, linguistic experience was found to affect F0. Individuals from the same community were found to realise F0 differently depending on whether their home language is Welsh or English.

Paper P4.37 (Presenter at poster: 09:45-11:30)
A logistic regression approach to accent class division in Japanese dialects: With special reference to the Keihan-type accent system in peripheral Kinki regions

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The accent system of Modern Japanese is characterized by patterns of high and low tones which are conventionally specified for each word, and words are grouped into several classes according to their accent patterns. Put differently, words belonging to the same class exhibit the same accent pattern. Some dialects, however, permit more than one accent pattern in the same class, which will be referred to as "accent class division" (ACD). In an attempt to explain this phenomenon, this paper takes a logistic regression approach, with the hypothesis that the features of consonants and vowels and their combinations are the possible factors. The data are from the Keihan-type accent in peripheral Kinki regions, especially Tokushima and Mie prefectures, where

ACD is widely observed. It will be shown that the composition of segments in a word affects the choice of accent patterns, resulting in ACD.

Paper P4.38 (Presenter at poster: 09:45-11:30)

It's all about, like, acoustics

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The present study explores the possibility of systematic acoustic differences that could be used to differentiate 'homophones'. This study investigates productions of 'like' in western Canadian English, focussing specifically on acoustic characteristics and whether they differ across multiple distinct lexical and grammatical functions. Segment duration, word duration, and degree of diphthongization are explored for variation as a function of semantic category. We demonstrate that some variation is predictable given the form of 'like' a speaker produces.

Paper P4.39 (Presenter at poster: 09:45-11:30)

The relationship between gender identity and six F0 measures in Polish

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This paper reports on a study of the relationship between gender identity, as measured by the Bem Sex-Role Inventory (BSRI) and six characteristics of F0 (mean, median, minimum, maximum, range and standard deviation) in semi-spontaneous speech of 24 Polish female speakers. Despite ample evidence suggesting that gender identity exerts an influence on voice quality, notably on pitch, whose main acoustic correlate is F0, the statistical analysis of the data gathered for the present study does not attest to a relationship between the BSRI score and F0 measures. An elaboration of culture-specific tools for measuring gender identity, as well as supplementing acoustic measurements with physiological and articulatory data are suggested as methodological developments needed to verify whether there are links between gender identity and F0 in Polish.

Paper P4.40 (Presenter at poster: 09:45-11:30)

The phonetics and distribution of non-question rises in two varieties of American English

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Utterance-final rises that do not convey questions have been of interest to linguists for years, for many varieties of English. Though a popular stigma exists in the U.S. that this phenomenon is typical of Southern Californian (SoCal) speakers, no study has compared IP-final rise use in U.S. varieties in terms of frequency or phonetic realization. We examine IP-final rises in two dialects of American English (SoCal and Massachusetts) produced in narratives. While variation in phonetic realization was found, there were no differences in the frequency of rises across region or gender. SoCal females produced the longest rises, while females from both regions produced rises with steeper slopes than their male counterparts. Thus while two geographically distant varieties are similar with respect to frequency, sociolinguistic variation is still found. We speculate that phonetic differences in rises produced by SoCal females may contribute to

the stigma that uptalk is "Valley Girl speak".

Paper P4.41 (Presenter at poster: 09:45-11:30)

An acoustic analysis of voice quality in London English: The effect of gender, ethnicity and f0

Szakay, Anita and Torgersen, Eivind

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This study investigates voice quality in London English, using acoustic features such as harmonic structure (H1-H2) and fundamental frequency (f0). We compare the speech of 28 Inner London Hackney speakers of Anglo and non-Anglo backgrounds with the speech of 14 Outer London Anglo speakers from Havering. The results reveal that voice quality and pitch significantly differ between the two locations, where Inner London speech is lower in pitch, yet more breathy in voice quality. This suggests that the H1-H2 measure is not necessarily dependent on global f0 values.

Speech Perception II: Consonant and Vowel Recognition

Thursday, August 13, 2015, 09:45-11:30

Paper P4.42 (Presenter at poster: 09:45-11:30)

Perception boundary between /s/ and /ts/ in Japanese at various speaking rates

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To examine effects of speaking rate on a perception boundary between voiceless fricative /s/ and affricate /ts/ in Japanese, a stimulus continuum of /s/-/ts/ at various speaking rates was constructed by changing rise and steady+decay durations of these phonemes. The stimuli in the continuum were presented to 33 Japanese native speakers, and their response ratio to /ts/ was measured. Logistic regression analysis of the response ratio revealed that the perception boundaries systematically differed as a function of speaking rate. However, when the rise and steady+decay durations were normalized by a logarithm of the averaged mora duration, the boundaries at different speaking rates nearly coincided. These results suggest that the speech perception system discriminates /s/ and /ts/ at various speaking rates with reference to a single boundary calculated with the normalized variables.

Paper P4.43 (Presenter at poster: 09:45-11:30)

Vowel identification at high fundamental frequencies in word context

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The question of vowel intelligibility as a function of F0 is still a matter of debate. Above all, it concerns vowel sounds produced at F0s exceeding vowel-related statistical F1 in citation-form words ('oversinging' F1). It is unclear whether vowel category perception inevitably shifts towards the neighboring category with a higher F1 or can be maintained in such cases. In this study, we tested listeners' perception of the long German vowels /i-y-e-ø-ɛ-a-o/ produced by a trained female speaker in the context of minimal

pair words (/l-V-gən/) at nine F0-levels between 220 and 880 Hz. Results showed that vowel identification was maintained > 80% up to F0=740 Hz for /e-ø-ɛ/ and up to F0=880 Hz for /i-y-a-o/. Thus, vowel identification could be maintained in cases of F0 significantly exceeding F1. The role of neighboring vowels, vowel duration, and other productional and acoustical aspects relevant for vowel perception at different F0s is discussed.

Paper P4.44 (Presenter at poster: 09:45-11:30)
Speech recognition experiment in 'natural quiet' background noise

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Listening abilities in humans have developed in rural environments which are the dominant setting for the vast majority of human evolution. Hence, the natural acoustic constraints present in such ecological soundscapes are important to take into account in order to study human speech. Here, we measured the impact of basic properties of a typical 'natural quiet' and non reverberant soundscape on speech recognition. A behavioural experiment was implemented to analyze the intelligibility loss in spoken word lists with variations of Signal-to-Noise Ratio corresponding to different speaker-to-listener distances in a typical low-level natural background noise recorded in a plain dirt open field. To highlight clearly the impact of such noise on recognition in spite of its low level, we contrasted the 'noise + distance' condition with a 'distance only' condition. The recognition performance for vowels and consonants and for different classes of consonants is also analyzed.

Sociophonetics II: Perception and Attitudes

Thursday, August 13, 2015, 09:45-11:30

Paper P4.45 (Presenter at poster: 09:45-11:30)
It's not phonetic aesthetics that drives dialect preference: The case of Swiss German

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Dialect stereotypes are widespread. Birmingham English is perceived as ugly, Parisian French as cultivated. In Switzerland, Bern and Thurgau Swiss German lie on opposite ends of the attractiveness spectrum. In the present study, we examined how Swiss German, French, and English listeners – the latter two being unfamiliar with the dialects – rated the phonetic aesthetics of these two Swiss German dialects. In a matched-guise design, listeners judged how pleasing stimuli read by a bidialectal speaker were. Results revealed that unfamiliar listeners did not show a preference while familiar listeners strongly preferred Bern Swiss German. The attractiveness of a dialect thus seems to be largely driven by the social attributes of its speakers and less so by its phonetic aesthetics. The realization of /r/ as apical or dorsal, however, strongly influenced preference judgments in familiar listeners.

Paper P4.46 (Presenter at poster: 09:45-11:30)

Mutual intelligibility of Chinese dialects: Predicting cross-dialect word intelligibility from lexical and phonological similarity

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This paper aims to predict mutual intelligibility (defined here as cross-dialectal word recognition) between 15 Chinese dialects from lexical and phonological distance measures. Distances were measured on the stimulus materials used in the experiment. Their predictive power was compared with earlier similar distance measures based on large word lists. Predictors based on just the stimulus materials used afford the better prediction. Segmental Levenshtein distance was the strongest predictor, outperforming both lexical and tonal similarity measures.

Paper P4.47 (Presenter at poster: 09:45-11:30)
Within-region diversity in the Southern Vowel Shift: Production and perception

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In this paper, we attempt to refine our understanding of the relationship between Southern Vowel Shift (SVS) norms and Southern orientation in the U.S. We ask to what degree Southerners from three different states (TN, NC, VA) show evidence of these shifts acoustically. Most crucially, we examine how much the different locales vary in terms of how much they align with traditional Southern features such as /ay/ monophthongization and /e/-/ɛ/ reversal. Then, through a perception study, we investigate whether differences exist in how the same speakers identify vowel categories in a perception task, looking particularly at how subjects across our three Southern sites compare.

Paper P4.48 (Presenter at poster: 09:45-11:30)
Regional backgrounds and discrimination patterns: A preliminary perceptual study in Quebec French

*Riverin-Coutlée, Josiane and Arnaud, Vincent
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This contribution focuses on the effect of geographical origin on perceptual patterns shown by naïve French-speaking listeners from two urban centers in the province of Quebec (Canada). Participants took part in an AXB discrimination task. The stimuli were naturally produced words ending with /ɛ/, the quality of which ranged from close to very open. Quebec City listeners obtained significantly higher results than Saguenay listeners and proved to be more sensitive according to a calculation of d' . We argue that this difference in the naïve listeners' perception is linked to differences in production, since regional variation was also found in the corpus: a group of experienced judges perceived tokens produced by Saguenay speakers as more open than tokens produced by Quebec City speakers.

Paper P4.49 (Presenter at poster: 09:45-11:30)
Perception of speaker social-indexical information from localised phonetic variants

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The present paper investigates perceptions of speaker social-indexical information, including gender, age and

social-class, from smaller phonetic segments such as gender-correlated phonetic variants. Since fundamental frequency (F0) is not the only cue to speaker gender identification, the perceptions are examined using gender-ambiguous sounding speech. The results of the study show that while speaker social-indexical information is identifiable at the segmental level, listeners seemed to be more sensitive to certain types of indexical information than others.

Paper P4.50 (Presenter at poster: 09:45-11:30)

Dialectal effects on the perception of Greek vowels

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This study examined cross-dialectal differences on the perception of Greek vowels. Speakers of Standard Modern Greek (SMG) and two dialectal areas (Crete, Kozani), all with five vowels in their systems, chose best exemplar locations (prototypes) for Greek vowels embedded in a carrier sentence spoken by a speaker of their dialect. The results showed that SMG, Cretan and Kozani vowels were well separated in the perceptual space. At the same time, there were dialect-induced differences in the positioning and distances between vowels as well as in the total space area covered by each dialect. The organisation of perceived vowel space therefore seems to be dialect-specific, a finding which is consistent with production studies examining the organisation of the acoustic vowel space.

known. English nonsense strings [ə'bVCa] were used. In one condition, the V was known but the C was not, with the reverse in the other condition; missing information was presented once phonation began. Results show anticipatory vowel effects on the final portion of the schwa (transitions into the stop) occurred only when the vowel was known ahead of time. Anticipatory effects of the V on the schwa's F2 were found throughout its duration when the V was known, but only for the speaker with the shortest V duration. Perseverative effects on the final vowel were similar in both conditions, as was consonant coarticulation. The implications of these results for planning are discussed, and the value of replication in the social sciences is emphasized.

Paper P4.53 (Presenter at poster: 09:45-11:30)

Changes in vowel velocity profile with vowel-consonant overlap

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We report the effect of a coronal consonant constriction on the movement of a preceding but temporally overlapping /a/. The dependent measure is the shape of the /a/ velocity profile and the independent variable is the temporal overlap of /a/ with the subsequent coronal constriction. We show that the /a/ velocity profile develops a shallower peak and a fatter right tail as the temporal overlap of /a/ with the subsequent coronal increases. These results challenge the idea that anticipatory consonant-to-vowel coarticulation is tightly localized in time and space by showing that anticipatory consonant-to-vowel coarticulation has a longer temporal window and greater spatial extent than originally thought.

Paper P4.54 (Presenter at poster: 09:45-11:30)

Long-distance anticipatory vowel-to-vowel assimilatory effects in French and Japanese

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This paper examines language-specific differences in anticipatory vowel-to-vowel coarticulation using two non-stress languages. Native speakers of Standard French (n=6) and Tokyo Japanese (n=5) served as subjects in a production study. To investigate possible long-distance effects between and beyond adjacent vowels, linguistic material consisting of /ba.bV/ and /ba.ba.bV/ was embedded within a carrier sentence in each language. The word-final trigger vowel (V) was /a/, /i/ or /u/. Acoustic analysis of continuous F1 and F2 trajectories as well as single-point formant measurements revealed opposite patterns in the two languages. Strong anticipatory effects in vowels up to 2 preceding syllables were observed in French. However, Japanese displayed few statistically significant anticipatory effects in any vowel preceding any trigger. We interpret the results as an indication that there are two rather different types of contextual phonetic variability. We also assert not all phonetic assimilatory effects in "coarticulation" are due to articulatory overlap.

Speech Production and Articulation III: Coarticulation

Thursday, August 13, 2015, 09:45-11:30

Paper P4.51 (Presenter at poster: 09:45-11:30)

Shape coarticulation in the spatial frequency domain: An example using /ɹ/

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One facet of coarticulation is tongue shape assimilation to surrounding segments. This study demonstrates the use of the Fourier transform for quantifying the effect of rhotics on surrounding sounds. Ultrasound images taken from American English speakers producing a rhotic-heavy sentence are used as test data. The method shows promise for describing shape coarticulation without the need for head stabilization. Potential uses of this method involve quantification of speech motor control strategies among different groups of speakers, such as children acquiring language and speakers with disorders of the speech motor system.

Paper P4.52 (Presenter at poster: 09:45-11:30)

Acoustic measures of planned and unplanned coarticulation

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We present a replication of an experiment [23] where vowel-to-vowel coarticulation was found when an utterance was initiated before an intervening consonant's identity was

Laboratory Phonology I*Thursday, August 13, 2015, 09:45-11:30*

Paper P4.55 (Presenter at poster: 09:45-11:30)

The other N: The role of repetitions and items in the design of phonetic experiments*Winter, Bodo**bodo@bodowinter.com*

Some branches of phonetics prefer experiments that feature a large number of repetitions and only few unique items. This paper discusses this relatively common experiment design choice, arguing that repetitions do not always help for drawing sound conclusions from phonetic data. It is recommended that phonetic experiments should be designed with less repetitions and more distinct items.

Paper P4.56 (Presenter at poster: 09:45-11:30)

Casual speech phonology and perception of further languages: The case of Latvian*Shockley, Linda and Bond, Dzintra**secondclarinet@gmail.com*

Common sense tells us that we use what we (unconsciously) know about our first language to process further languages. The contribution of casual speech phonology has not been examined from this point of view. This paper looks at shared phonological processes of this type as possible aids to perception of L2 English. We propose that complex syllable structure promotes casual speech reduction, as it leads to long consonant clusters, especially across word boundaries. English and Polish share this complexity, and L1 Polish speakers are good at perceiving casually-spoken English. However, while Latvian has a potential for complex syllables, it is not often realised, and as a result, English-type reductions are not evinced. We suggest that because Latvian does not share many casual speech processes with English, perception of English casual speech may be problematic. This is borne out by test results.

Paper P4.57 (Presenter at poster: 09:45-11:30)

Aspiration and the gradient structure of English pre-fixed words*Zuraw, Kie and Peperkamp, Sharon**kie@ucla.edu*

Building on work examining the phonetic properties of pre-fixed and pseudoprefixed English words (mis-times vs. mistakes), we investigate aspiration in 110 English words beginning with mis- and dis-, produced by 16 native speakers of American English. We find that some items show considerable cross-speaker variation, but most are stable. Aspiration can occur even before an unstressed syllable (dis-[ph]osessed), suggesting that not only word-initial but also some stem-initial voiceless stops are aspirated in English, either because of their prosodic position (prosodic-word-initial) or because of the influence of the stem's freestanding pronunciation. Frequency factors correlate with an item's propensity to aspirate, supporting the view that whole-word and decomposed representations compete.

Paper P4.58 (Presenter at poster: 09:45-11:30)

A two-decade-interval variation in vowel insertion after word-final English and French postvocalic plosives in Korean adaptation*Kim, Hyunsoon**hyunsoonkim@hotmail.com*

We have investigated whether variation in vowel insertion after word-final English and French postvocalic plosives in Korean adaptation has changed in a two-decade interval by collecting English and French loanword data in the early 1990s and the year 2011. The comparison of our 2011 data to the early 1990s data has revealed that the overall frequency of final vowel insertion and that of no vowel insertion are significantly decreased and increased, respectively, no matter whether the plosives are released, as in French, or not, as in English. For the diachronic change, we propose that Korean syllable structure constraints such as the Coda constraint exert more influence on variation in vowel insertion in the 2011 data than two decades ago and that the greater role of the Coda constraint in the 2011 data is due to more direct contact with English and less direct contact with French.

Paper P4.59 (Presenter at poster: 09:45-11:30)

Feature distance effects in a word reconstruction task*Moates, Danny; Bond, Z. S. and Stockmal, Verna**moates@ohio.edu*

Some models of spoken word recognition assume that the phonetic segments of a word are composed of distinctive features. A match between a feature detector and feature information in the acoustic signal increases the chance of identifying the phonetic segment. If only some of the detectors for a segment match, the chances of identifying the segment drop. Pairs of segments differ in the number of features they share, e.g. /f/ and /v/ differ by just one feature whereas /f/ and /g/ differ by six. Correctly identifying /f/ should occur more often if it were replaced by /v/ than if it were replaced by /g/. The present experiment tested the hypothesis that the greater the feature distance between a target segment and a replacing segment, the poorer the chance of correctly identifying the target segment. The hypothesis was tested for two feature systems and with two matching strategies. This experiment offers some support for the hypothesis.

Paper P4.60 (Presenter at poster: 09:45-11:30)

Aerodynamic tool for phonology of voicing*Meynadier, Yohann**yohann.meynadier@lpl-aix.fr*

The paper addresses the question of the phonetic implementation of phonological voicing in French. It is investigated by means of aerodynamic measures made at the subglottal, glottal and supraglottal stages of the production of fricatives in modal voice and in soft and loud whisper for one speaker. The results show that the [±voice] feature is systematically associated only with the categorical constrictions of the glottis, even without vocal fold vibration.

Paper P4.61 (Presenter at poster: 09:45-11:30)

Differential positional neutralization of back vowels in two Majorcan Catalan sub-dialects*Llompart, Miquel and Simonet, Miquel*

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The present paper explores the patterns of unstressed vowel reduction affecting the three back vowels of Catalan: /ɔ/, /o/ and /u/. In particular, we examine two reduction patterns found in the Catalan dialect spoken on the island of Majorca: (i) the general Majorcan pattern according to which /ɔ/ and /o/ merge to [o] in unstressed position and /u/ remains different (as [u]), and (ii) a pattern found only in one small village on the island of Majorca, Sóller, according to which /ɔ/, /o/ and /u/ all merge to [u]. By means of an acoustic study, the present paper establishes that the traditional impressionistic descriptions of these subdialects of Catalan with respect to their back vowels are correct and that these processes are thus best described as categorical, phonological (rather than gradient, phonetic) processes.

Paper P4.62 (Presenter at poster: 09:45-11:30)
An articulatory study of posterior nasal diphthongs in Brazilian Portuguese

*Demasi, Rita; Savariaux, Christophe and Demolin, Didier
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Nasal diphthongs are quite rare in the world's languages. This paper analyzes how speakers control articulatory movements for nasal diphthongs in Brazilian Portuguese (BP). Our aim is to characterize the oral-nasal coupling in posterior nasal diphthongs from the Paulistano dialect spoken in the city of São Paulo. We show that oral and nasal diphthongs have different tongue contours, besides velopharyngeal coupling. A 2D EMA study was carried out to contrast [aw] and [ãŵ] in monosyllabic words.

Paper P4.63 (Presenter at poster: 09:45-11:30)
Effects of phonological neighborhood density on word production in Korean

*Holliday, Jeffrey and Turnbull, Rory
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Studies have offered conflicting evidence for the effects of phonological neighborhood density (PND) on word production. Firm conclusions have been further hindered by the fact that most research on the effects of PND has been conducted on English. The purpose of this study was to provide an additional perspective by examining the effects of PND on word production in Korean. It was found that although PND correlated with both word duration and vowel duration, the effects were substantially diminished once certain segmental influences were controlled for. Additionally, no effect of PND was found on the VOT or f0 accompanying word-initial lax obstruents. We conclude that understanding variation in segmental content is vital to understanding the effects of PND.

POSTER SESSION 5

Speech Prosody II: Phrasal Aspects

Thursday, August 13, 2015, 15:00-16:45

Paper P5.1 (Presenter at poster: 15:00-16:45)

The intonation of right-dislocated constituents in French

*Le Gac, David
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In French, the intonation of post-focus items is not clearly determined. Traditional descriptions claim that post-focus intonation entirely depends on that of the focus via a process of tonal copy; other accounts argue for either autonomous patterns or a binary independent choice between a high and a low tone. To clarify this issue, this paper investigates the melodic patterns of right-dislocated constituents after eight different contours associated with the focus. Results confirm that post-focus phrases are characterized by an iterative and reduced copy of the focal tones; it is also shown that a mid or downstepped high tone is needed to describe intonation in French and that we must posit contours that constitute single complex units.

Paper P5.2 (Presenter at poster: 15:00-16:45)

Modelling Japanese intonation using PENTAtrainer2

*Lee, Albert and Xu, Yi
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This paper presents results from Japanese intonation modelling using PENTAtrainer2, an articulatory synthesiser. Our first aim is to show that PENTA, on which PENTAtrainer2 is based, can achieve high accuracy in predictive synthesis of varying intonation contours. We trained the synthesiser on a 6251-sentence functionally annotated corpus and generated F0 contours for each communicative condition. The accuracy of speaker-dependent and independent synthesis, together with naturalness ratings, show that PENTA is effective in modelling Japanese intonation. This suggests that once contextual variability is incorporated into a model, multi-functional targets alone would suffice as the prosodic representation even in a sizeable corpus.

Paper P5.3 (Presenter at poster: 15:00-16:45)

Acoustic correlates of emphasis in Estonian

*Mihkla, Meelis; Sahkai, Heete and Kalvik, Mari-Liis
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The paper tests for several potential acoustic correlates of the emphatic accent differentiating between broad focus and clause-final narrow focus in Estonian. The examined correlates were related to F0, duration, intensity and spectral emphasis. Interestingly, duration was found to be by far the strongest correlate of emphasis, whereas cross-linguistically emphasis has been found to be expressed primarily with F0. Since duration relationships in the disyllabic foot play an important role in Estonian word prosody, be-

ing the primary correlate of the Estonian three-way quantity system, the study additionally examined the interaction of emphatic lengthening with word quantity. It was found that emphatic lengthening does not affect the quantity features, but depends on the quantity structure of the word, affecting primarily the segment that bears the quantity.

Paper P5.4 (Presenter at poster: 15:00-16:45)

The perception of two linguistic functions of prosody in Danish

Tøndering, John and Morris, David

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This paper examines the prosodic perceptual ability of listeners ($n=22$) in tasks involving global intonation contours and local voice pitch variation. The signaling of utterance type was tested with speech material that included read and non-scripted questions and statements. Local variation was tested with an identification task where the level of prominence of an anaphor signaled either the subject or non-subject of a preceding sentence. Logistic regression revealed that question and statement identification differed between read and non-scripted material and was not linked to performance on the subject/non-subject task. A response bias was also observed in the vcooded condition towards statements. We conclude that performance differences between the two tasks may be due either to the task-related language ability of the listener or to differences in the perception of global and local prosody.

Paper P5.5 (Presenter at poster: 15:00-16:45)

Prosodic patterns of noun phrases in English, Mandarin and L2 English

Zhou, Weijing; Song, Huiping; Hua, Yan; Gong, Jian and Chen, Qian

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This study focuses on the prosodic patterns of noun phrases (NP) in English, Mandarin and L2 English so as to find out the prosodic similarities and differences between English and Mandarin as well as the effects of the prosody of L1 Mandarin on the acquisition of L2 English NP prosody. The results reveal that English NPs usually have one IP for the NPs with pre-modifiers and two IPs for those with post-modifiers, and the tonicity is on the head noun with a falling tone pattern of H*+L 0%. In contrast, Mandarin NPs are usually chunked into two or more IPs when there are one or more modifiers between the determiner and head noun, and the tonicity is usually on the modifiers with an up-stepped lexical tone on nucleus accented syllables. As for Mandarin speakers' L2 English NPs, they share more typical prosodic patterns of L1 Mandarin NPs, demonstrating a strong transfer from L1 prosodic system.

Paper P5.6 (Presenter at poster: 15:00-16:45)

The implementation of phrasal prosody by native and non-native speakers of English: SS ANOVA for multi-syllabic intonation contours

Morrill, Tuuli

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Non-native speakers often have difficulties with prosody; stress and intonation patterns that differ from those of native speakers can contribute to "foreign accent," even at high

proficiency levels. Although effects of a listener's native language on the perception of prosody are well established, few studies have examined non-native prosody production. In particular, it is not known whether the placement of prominence in words and phrases differs between native and non-native speakers in reliable ways. The current study examines a corpus of native and non-native English speech, to look for group differences in the production of intonation contours. Using smoothing spline analysis of variance (SS ANOVA), the phrasal pitch contours of identical speech passages produced by 197 speakers of four different native languages are compared. Results suggest that a speaker's native language has predictable effects on the production of phrasal intonation patterns.

Paper P5.7 (Presenter at poster: 15:00-16:45)

Interlanguage influence in cues of narrow focus: A study of Hong Kong English

Gananathan, Richard Yohann; Yin, Yanjun and Mok, Peggy Pik Ki

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The acoustic properties of narrow focus are language-specific. Post-focus compression of pitch is one of the most prominent factors characterizing focus in English, but it is not present in Cantonese, where duration and intensity are more dominant. Hong Kong English (HKE) is an emerging variety of English in Hong Kong, characterized by speakers who grow up learning English from a young age, but with input highly influenced from the dominant language of Cantonese. Experiments were conducted testing production and perception of focus in HKE speakers. An overall tendency was observed for speakers to have accurate perception, but production that was non-characteristic of traditional varieties of English. Analysis of the highest-scoring participants found that their usage of pitch to mark focus was minimal, but usage of duration was significant.

Paper P5.8 (Presenter at poster: 15:00-16:45)

Can formant shifts and effort cues enhance boundary tone perception in whispered speech?

Heeren, Willemijn

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Whispered speech holds cues to speech melody, in spite of the absence of F0. Shifts in the locations of formant peaks have been forwarded as a main cue. Whispering speakers, however, may convey high versus low boundary tones signalling questions versus statements without shifting their formants. Would the addition of formant shifts enhance these natural productions and improve question/statement classification in whisper? Moreover, multiple acoustic correlates tend to vary with pitch or intonation conditions in whispered speech, and may function as listener cues. Here, an attempt was made to better understand the function of one of these 'secondary' cues: intensity. Results show that formant shifts may improve performance, but not dramatically, and that intensity seems more useful when coding increased effort than when being higher across the board to compensate for reduced audibility in whisper.

Paper P5.9 (Presenter at poster: 15:00-16:45)

Phonetic focus-marking in Korean-speaking 7- to 8-year-olds and adults

Yang, Anqi; Cho, Taehong; Kim, Sahyang and Chen, Aoju
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This study investigates how Seoul Korean-speaking children and adults use pitch-and duration-related phonetic cues to mark focus. It was found that to distinguish focus from non-focus, the adults used both the pitch-and duration-related cues, but the children used only the duration-related cues to distinguish focus from post-focus. Further, neither the adults nor the children distinguish narrow focus and broad focus via any of the phonetic cues. However, while the adults did not distinguish contrastive focus from (non-contrastive) narrow focus phonetically, the children distinguish these two using duration in the 'short' words.

Paper P5.10 (Presenter at poster: 15:00-16:45)
The phrasing of dislocations in French: Comparing spontaneous speech and reading
Smith, Caroline and Napoleão de Souza, Ricardo
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Spoken French makes extensive use of dislocations, where one phrase, usually the subject, is set off from the main clause, and within that clause, a pronoun is used. Previous findings are conflicting about the strength of the prosodic boundary, if any, between the dislocation and the main clause. We compare productions of dislocations in conversation and in identical sentences read aloud. Both spontaneous and read tokens showed higher f0 in the syllable preceding the putative boundary, although the difference was smaller in spontaneous speech. Durational variation was estimated using two methods to control for speaker and item variation; no lengthening was found in spontaneous speech, but it was substantial in reading. These results contrast with previous suggestions [7] that lengthening may mark this boundary more robustly than f0. The variation between speech styles suggests that all dislocations cannot be analysed by the same prosodic unit. [Support from NSF BCS-1251134].

Paper P5.11 (Presenter at poster: 15:00-16:45)
Multiple contrastive accents in German production: Syntactic and rhythmic factors
Schauffler, Nadja; Turco, Giuseppina and Augurzky, Petra
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The prosody of utterances containing one focused constituent is well investigated in German. However, little is known about the realisation of multiple contrastive accents in double-focus contexts. The present study addresses syntactic and rhythmic factors affecting the occurrence of multiple contrastive accents. In particular, we compare the prosodic marking of double-focused argument-predicate constructions and argument-argument constructions and their rhythmic environment, predicting that a pitch accent might be omitted if its production were to lead to a pitch accent clash (i.e. two accented syllables directly following each other). The present results show that in focused contexts, predicates are less acceptable than arguments and that pitch accent clashes are generally avoided. Both factors, syntactic status and rhythm constraints, should be taken into account in models of focus-to-accent mapping.

Paper P5.12 (Presenter at poster: 15:00-16:45)

An articulatory-functional approach to modeling Persian focus prosody

Taheri-Ardali, Mortaza and Xu, Yi
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This paper is an attempt to test PENTA, an articulatory-functional model, on Persian focus prosody. The test was done on a corpus consisting of utterances with different focus conditions using PENTAtainer2, a trainable prosody synthesizer that optimizes categorical pitch targets each corresponding to multiple communicative functions. The evaluation was done by comparing the F0 contours generated by the extracted pitch targets to those of natural utterances through numerical and perceptual evaluations. The numerical results showed that the synthesized F0 was close to the natural contour in terms of RMSE (= 1.94) and Pearson's r (= 0.84). Perceptual evaluation showed that the rate of focus identification and naturalness judgement by native Persian listeners were highly similar between synthetic and natural F0 contours.

Paper P5.13 (Presenter at poster: 15:00-16:45)
Tone, intonation, and emphatic stress in L2 Mandarin speech by English and Cantonese learners
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On the basis of a set of well-controlled sentences varying in sentence type, tone identity, and focus position, the present study compared F0 characteristics of Mandarin speech between native speakers and two groups of L2 learners whose native languages were Cantonese and English respectively. The results showed systematically that most L2 errors in the F0 manifestations of tone, intonation, and emphatic stress could be explained by language transfer effects. The findings can be used to guide L2 learning of Mandarin.

Paper P5.14 (Presenter at poster: 15:00-16:45)
Individual differences in prosodic strategies to sentence parsing
Bishop, Jason; Chong, Adam J. and Jun, Sun-Ah
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This study investigated individual differences in the use of prosodic structure in the resolution of syntactic ambiguity in English, exploring listeners' sensitivity to the placement of prosodic boundaries in the parsing of relative clauses. Previous work, carried out in the context of the Implicit Prosody Hypothesis, has shown that variation in "autistic"-like personality traits in neurotypical individuals predicts the use of prosody for this purpose, although this work utilized silently-read materials. In the current study, we investigated the comprehension of auditorily-presented sentences and found such traits to only weakly predict syntactic parsing. We propose that autistic traits primarily influence sensitivity to accentuation (rather than phrasing) in sentence processing, affecting sensitivity to prominence in terms of both pitch accent status as well as pitch accent realization.

Paper P5.15 (Presenter at poster: 15:00-16:45)
Prosodic and syntactic segmentation of spontaneous speech: A preliminary study
Dannenberg, Anna; Suni, Antti; Vainio, Martti and Werner,

Stefan

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In this paper we examine prosodic and syntactic segmentation of the spoken Finnish language. Syntactic sentence or clause is generally mentioned as one of the basic units of language, but it can be questioned whether it is a good unit for analysing the structure of spontaneous speech. By wavelet-based analysis, the prosodic structure of speech can be represented as a tree diagram, making it possible to compare prosodic and syntactic hierarchical structures of spoken language. As a first step, we compare here syntactically and prosodically defined speech segments and their boundaries. Our preliminary results show many similarities but also discrepancies between the prosodic and syntactic segments of spontaneous Finnish speech. These results serve as a good starting point for further comparison of syntactic and prosodic structures of spoken language.

Multimodal Phonetics

Thursday, August 13, 2015, 15:00-16:45

Paper P5.16 (Presenter at poster: 15:00-16:45)

Influences of visual speech information on the perception of foreign-accented speech in noise

*Kawase, Saya; Kim, Jeesun; Aubanel, Vincent and Davis, Chris
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This study examined the extent to which visual speech assisted native Australian English speakers to perceive Japanese-accented English compared with Australian English spoken sentences presented in speech-shaped noise (SNR:-4dB). Twenty-one native Australian English listeners performed a speech perception in noise task with Japanese-accented and Australian English sentences in two conditions: an Audio-only condition (AO) and an Audio-visual condition (AV) where the talker's face was also shown. The results showed that the addition of visual speech information facilitated the speech perception for both Australian English and Japanese-accented English. However, the visual benefit was significantly smaller in the perception of Japanese-accented English, indicating that foreign-accented speech affects the visual speech benefit potentially due to non-native visual form and timing differences.

Paper P5.17 (Presenter at poster: 15:00-16:45)

Cross-modal association between colour, vowel and lexical tone in nonsynesthetic populations: Cantonese, Mandarin and English

*Mok, Peggy Pik Ki; Yin, Yanjun; Lan, Chen and Him, Cheung
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Previous studies suggested that synesthesia-like coloured hearing could be found in nonsynesthetic population for both vowel quality and pitch. The vowel-colour and pitch-colour associations were investigated separately so it is unclear whether vowel quality or pitch has a stronger effect on cross-modal colour association, and how they may interact. No study has investigated this phenomenon in a tone language in which pitch differences are intrinsically

coded with vowel qualities. The current study aims to examine whether there is non-random sound-colour mappings for Cantonese vowels in native and non-native (Mandarin and English) listeners. The results suggested that non-synesthetic subjects showed non-arbitrary vowel-colour associations of Cantonese vowels, and pitch played a more fundamental role than vowel quality in coloured-hearing.

Paper P5.18 (Presenter at poster: 15:00-16:45)

Examining visible articulatory features in clear and conversational speech

*Tang, Lisa; Hannah, Beverly; Jongman, Allard; Sereno, Joan A.; Wang, Yue and Hamarneh, Ghassan
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This study investigated the relationship between clear and conversational speech styles and the motion of visible articulators. Using state-of-the-art computer vision and image processing techniques, we examined front and side view videos of 18 native English speakers' faces while they recited six English words containing various vowels (keyed, kid, cod, cud, cooed, could) and extracted measurements corresponding to the lip and jaw movements. Significant effects were found for style, gender, and saliency of visual speech cues. Clear speech exhibited longer vowel duration and more vertical lip stretching and jaw movement for all vowels, more horizontal lip stretching for front vowels, and a greater degree of lip protrusion for rounded vowels. Additionally, greater articulatory movements were found for male than female speakers in clear speech. These articulatory movement data demonstrate that speakers modify their speech productions in response to communicative needs in different speech contexts.

Paper P5.19 (Presenter at poster: 15:00-16:45)

A comparison of audiovisual and auditory-only training on the perception of spectrally-distorted speech

*Alghamdi, Najwa; Maddock, Steve; Brown, Guy J. and Barker, Jon
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Recent research suggests that using visual speech in auditory training can improve auditory-only speech perception. The long term aim of our work is to investigate this approach for hearing-impaired users, in particular cochlear-implant users. In the pilot study presented in this paper, we use spectrally-distorted speech to train two different groups of normal hearing subjects: native English and non-native, English-speaking Saudi listeners. Our pilot study suggests that both groups attain similar improvement in audio-only speech perception when visual speech is introduced into the training process. This may provide evidence that cochlear implant users would benefit from introducing visual speech in training, given that the reduced processing abilities of non-native listeners for native speech could be compared to the reduced processing abilities of cochlear implant users as a result of the inherent noise in the processing of sound by a cochlear implant.

Paper P5.20 (Presenter at poster: 15:00-16:45)

A preliminary study of the temporal relationship between prosody and gesture in Hong Kong Cantonese

*Fung, Holly Sze Ho and Mok, Peggy Pik Ki
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Previous studies of speech and gesture in intonational languages generally suggested that prosodic and gestural prominence are aligned with one another, pitch accented/stressed syllable or the peak fundamental frequency (F0) of it being the prosodic anchor. A logical question to raise would be whether such alignment exists in tonal languages without lexical stress. To answer the question, this study investigated the timing of pointing gestures relative to their co-occurring corrective foci in Hong Kong Cantonese in a picture-naming task. Results show that prosodic prominence on the focused syllables was solely realized by durational increases. However, the occurrence of gestural apices was found insensitive to such changes. Neither was it found to be affected by different lexical tones of the foci.

Paper P5.21 (Presenter at poster: 15:00-16:45)
The effect of auditory and visual signal availability on speech perception

*Kim, Jeesun; Aubanel, Vincent and Davis, Chris
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We used Auditory/visual masks to investigate how the availability of speech signals governs speech perception. Stimuli were videos of a talker uttering sentences. The auditory mask consisted of speech shaped noise; the visual mask, a circular patch obscuring the talker's mouth region. Auditory signals were quantified by the glimpse proportion (GP); visual signals by visual entropy (VE), a measure based on visual change. Auditory stimuli mixed with the noise at -3 dB SNR were presented paired with the talker's static or moving face (full vs. masked face) for speech identification. Speech identification was more accurate with the moving face (visual benefit); with greater benefit for the full than masked face. The GP correlation with speech identification scores was highest in the static face condition. The visual benefit was correlated with the VE but only when the latter correlated highly with mid-frequency speech energy of the auditory signal.

Paper P5.22 (Presenter at poster: 15:00-16:45)
Reconsidering the McGurk effect

*Mildner, Vesna and Dobric, Arnalda
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The McGurk effect was studied on 3 groups of subjects differing in age: pre-schoolers (mean: 6 years), elementary-school 4th-graders (mean: 11 years) and adults (mean: 24 years). The stimuli included audio-visual combinations of syllables /pa/, /ta/, /ka/, /ba/, /da/, /ga/. The combination of auditorily presented (A) bilabials with visually presented (V) velars, was reported by some subjects as a third (dental, e.g. /da/) plosive, and in the reversed-modality combination as a bilabial+velar response (e.g. /bga/), manifesting the McGurk effect. In all groups, dental-velar pairs and V_dentals combined with V_bilabials elicited close to 100% responses corresponding to the A stimuli. V_dentals combined with A_bilabials elicited an unexpectedly high proportion of responses corresponding to the visual stimuli. The McGurk effect seems less robust than commonly reported and exhibits individual variation. Group differences were inconsistent and the effect strength could not be attributed to age.

Paper P5.23 (Presenter at poster: 15:00-16:45)

Cross-modal description of sentiment information embedded in speech

*Watanabe, Kanako; Greenberg, Yoko and Sagisaka, Yoshinori
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Looking for new possibilities to describe the information embedded in speech, we have carried out sentiment correlation analysis between speech features and color attributes. Using single vowel utterances with different prosody and sound pressure level, we asked subjects to select colors based on their perceptual impressions after listening to them. By analyzing selected color attributes using Value, Saturation and Hue, we found high correlations between mean F0 and Value, sound pressure level and Saturation, and Formants and Hue. These correlations coincided with previous observations using speech and color categories, which suggests a possibility for visualization of sentiment information embedded in speech based on cross-modal sentiment correlations.

Phonation and Voice Quality

Thursday, August 13, 2015, 15:00-16:45

Paper P5.24 (Presenter at poster: 15:00-16:45)

Voice quality description from a phonetic perspective: Supralaryngeal and muscular tension settings

*Camargo, Zuleica; Gomes Coutinho, Perpétua; Madureira, Sandra and Rusilo, Luiz Carlos
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This study aims at investigating the acoustic correlates of supralaryngeal and muscular tension voice quality settings (VQS). Speech samples from 40 speakers were perceptually analyzed by means of the Vocal Profile Analysis Scheme (VPAS). Acoustic analysis comprised formant frequency (F1, F2 and F3) and intensity measurements (I1, I2 and I3) of seven Brazilian Portuguese vowels. Multivariate statistical analysis was performed to take into account the discriminant capability of the acoustic measures to detect VQS as well as influences from gender, age and vowel type. The results have shown the discriminant power of formant measures to predict neutral and non-neutral VQS: I1, F3, I3 and I2 correlated with supralaryngeal VQS and F1 and F1, I2 and I3 with muscular tension. The canonical correlation analysis of VQS, formant measures and gender variables have shown that neutral VQS grouped with F1 and F2 and non-neutral VQS grouped with F3, I1, I2 and I3.

Paper P5.25 (Presenter at poster: 15:00-16:45)

Gender variation in creaky voice and fundamental frequency

*Melvin, Shannon and Clopper, Cynthia G.
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The current study examines creaky voice and the fundamental frequency associated with modal and creaky voicing across genders. We analyzed read speech data from five male and five female Midwestern Americans between the ages of 18 and 25. We found that female speakers use creaky voice more often than male speakers in this dialect. Addi-

tionally, the male speakers produced a much smaller difference in fundamental frequency between modal and creaky voicing than the female speakers. We suggest that the difference in fundamental frequency ranges across genders may cause creaky voice to be more perceptually salient in the speech of women than men. As a result, we propose that women use creaky voice more often than men because it is more salient in their speech and may thus more easily carry social meaning.

Paper P5.26 (Presenter at poster: 15:00-16:45)

Variation in glottalization at prosodic boundaries in clear and plain lab speech

Luthern, Erin and Clopper, Cynthia G.

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Previous research on glottalization shows that this voice quality occurs more frequently at prosodic boundaries than in the middle of prosodic phrases. This study investigates ten speakers' use of glottalization at prosodic boundaries in five passages read in both clear and plain lab speech. We analyzed each syllable in every passage for its voice quality (glottalized or modal) and for its prosodic boundary strength using the ToBI system. We found that glottalization is used regularly in phrase-final syllables, and marginally in phrase-initial syllables. We also found that speaking style had no effect on overall glottalization.

Paper P5.27 (Presenter at poster: 15:00-16:45)

Influence of spectral cues on the perception of pitch height

Kuang, Jianjing and Liberman, Mark

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This study aims to provide direct perceptual evidence of whether listeners integrate spectral cues in pitch-range perception. A forced-choice pitch classification experiment with four spectral conditions was conducted to investigate whether spectral cues manipulation can affect pitch-height perception. The results show that the pitch classification function is significantly shifted under different spectral conditions. Listeners generally hear a higher pitch when the spectrum has higher high-frequency energy (i.e. tenser phonation). This study strongly supports the hypothesis that voice quality cues and F0 interact in pitch perception.

Paper P5.28 (Presenter at poster: 15:00-16:45)

Investigating source-filter interaction to specify classic speech production theory

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The paper is concerned with the specification and improvement of the traditional source-filter model of the human vocal tract proposed by G.Fant and analyzed by many scientists. The new method of recording the glottal wave synchronously with an output speech signal was employed to obtain the experimental material. The comparison of the recorded signals allowed analyzing the structure of the speech signal at different stages of its generation. As a result, the classic vocal tract model was specified by distinguishing a feedback component which formalizes the processes in the vocal tract as a complex acoustic nonlinear system. One of the functions of the component is to transform the acoustic

energy from the articulation system upstream. In the paper the recording method is described, and the perceptual experiment and the acoustic analysis results are presented.

Paper P5.29 (Presenter at poster: 15:00-16:45)

Acoustic characteristics of Aymara ejectives: A pilot study

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This study investigates acoustic characteristics of Aymara ejectives. Acoustic measurements of the Aymara ejectives were conducted in terms of the durations of the release burst, the vowel, and the intervening gap (VOT), the intensity and spectral centroid of the release burst, and H1-H2 of the initial part of the vowel. Results showed that ejectives vary with place of articulation in the duration, intensity, and centroid of the release burst but commonly have a lower H1-H2 irrespective of place of articulation.

Paper P5.30 (Presenter at poster: 15:00-16:45)

Influences of speaker attitudes on glottalized tones: A study of two Vietnamese sentence-final particles

Mac, Dang-Khoa; Nguyen, Thi-Lan; Michaud, Alexis and Tran, Do-Dat

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Attitudinal information in a spoken utterance can be lexically encoded; it can also be conveyed by intonation, including modification of voice quality. This study aims to investigate how speaker attitude affects the realization of glottalized tones in Vietnamese. A specific recording setup was designed; a corpus containing attitudinal sentence-final particles (SFPs) was recorded by ten speakers. The present report contains qualitative observations and quantitative assessments for two glottalized tones (B2, the "drop tone", and C2, the "broken tone") in utterances realized with attitudes of SURPRISE or IRRITATION, as contrasted with simple DECLARATION. The results suggest that there is a considerable range of intonational (allotonic) variation in the realization of glottalization, and that it contributes to expressing speaker attitude – and is likely to convey other types of prosodic information as well.

Paper P5.31 (Presenter at poster: 15:00-16:45)

Voice quality variation in Scottish adolescents: Gender versus geography

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Given the importance of voice quality in signalling personal identity and social group membership, effective control of voice features may become especially important during adolescence, yet this has to be achieved in the context of significant physical changes within the speech production system. Most previous research has focussed on phonation, but this study used Vocal Profile Analysis (VPA) [11] for perceptual analysis of both laryngeal and vocal tract voice settings in Scottish adolescents, in order to identify voice quality markers of gender and geographical background in this age group. VPA analysis was carried out for 76 speakers (31 male; 45 female), drawn from three geographically distinct areas of Scotland. Some of the observed variation in voice quality (especially phonatory settings) may be attributable

to physical changes associated with puberty, but other setting adjustments seem more likely to be sociophonetic in origin.

Paper P5.32 (Presenter at poster: 15:00-16:45)
Acoustic properties of different kinds of creaky voice
Keating, Patricia; Garellek, Marc and Kreiman, Jody
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There is not one kind, but instead several kinds, of creaky voice, or creak. There is no single defining property shared by all kinds. Instead, each kind exhibits some properties but not others. Therefore different acoustic measures characterize different kinds of creak. This paper describes how various acoustic measures should pattern for each kind of creak.

Paper P5.33 (Presenter at poster: 15:00-16:45)
The perception of coolness: Differences in evaluating voice quality in male and female speakers
Greer, Sarah D.F. and Winters, Stephen J.
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We investigated possible motivations for the perceived increase in the use of creaky voice by young speakers by having listeners evaluate pairs of stimuli produced by different speakers in three different voice qualities (modal, creaky, breathy), along four different dimensions (coolness, youthfulness, attractiveness and authoritativeness). Generally, modal voice was the most preferred voice quality in each dimension, and creaky voice was the least preferred. However, creaky voice did yield a greater number of "authoritative" judgments. Judgments also differed according to the sex of the speaker: creaky voice made men sound more "cool" and "attractive", while listeners were more likely to select breathy voice as the preferred voice quality for women for all four dimensions. These findings indicate that speakers may be tapping into creaky voice as a means of establishing "authority", although women may additionally be using it more to tap into the sociolinguistic status of men.

Paper P5.34 (Presenter at poster: 15:00-16:45)
A case study on the efficacy of ultrasound biofeedback in voice pedagogy
Nair, Angelika; Schellenberg, Murray and Gick, Bryan
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This paper presents a case study on the use of ultrasound as visual biofeedback in a short master class lesson for two young, tenor singers-in-training. Even in such a short period of time, the singers both exhibit subjectively improved changes in production techniques such as the movement and position of the tongue and the Low Mandible Maneuver (LMM – the downward relaxation of the singer's posterior mandible); a technique used to increase the space in the oropharynx used as a resonance cavity which is found in most world-class opera singers. The former specifically showed expedited kinesiological and biomechanical improvements and understanding (e.g. coordination, direction and point of articulation) through the visual information of the ultrasound; an important but difficult aspect especially at the beginning of voice training. Observed measures of formant values suggest that the young singers are able to maintain recognizable vowel production while mod-

ifying their articulation technique.

Paper P5.35 (Presenter at poster: 15:00-16:45)
Voicing assimilation in whispered speech
Kohlberger, Martin and Strycharczuk, Patrycja
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A large body of literature has shown that phonemic voicing contrasts are preserved in the production and perception of whispered speech. Nevertheless, it is unclear to what extent allophonic voicing is also maintained in whisper. The present study investigates whether a non-contrastive voicing distinction in Spanish fricatives – which results from voice assimilation in obstruent clusters – is also acoustically cued in whispered speech. In order to test this, a production experiment was conducted with 11 speakers of Peninsular Spanish. A number of acoustic cues relating to the fricatives in question and their surrounding phonological environment were measured. Four cues were found to be affected by voicing assimilation in normal phonation. Crucially, one cue (preceding vowel duration) was found to be affected by voicing assimilation in both normal and whispered phonation. These results show that non-contrastive voicing distinctions are also maintained in whispered speech.

Paper P5.36 (Presenter at poster: 15:00-16:45)
Constructing a speech banana for Thai consonants: Some considerations for male and female voices
Tantibundhit, Charturong; Onsuwan, Chutamanee and Klang-pornkun, Nittayapa
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"Speech banana" is a banana-shaped plot of speech power distribution. It shows speech sounds spoken with normal loudness in terms of frequency and intensity level. Speech bananas have been mainly proposed for Indo-European languages. This work describes ongoing work constructing a speech banana for Thai, a Non-Indo-European language. Speech materials are taken from 11 Thais (males and females). Comparisons are carried out to examine if there is any difference in speech power distribution of 21 consonants from male and female voices. The findings show statistically significant differences in terms of level of intensity for 13 phonemes (/m/, /b/, /n/, /d/, /ŋ/, /j/, /r/, /w/, /l/, /k/, /h/, /ph/, /f/, and /k/) and in terms of frequency for /s/ only. It is suggested that significant acoustic differences associated with male and female voices should be incorporated in the representation of a speech banana.

Phonetics of Second and Foreign Language Acquisition III: Prosodic Aspects

Thursday, August 13, 2015, 15:00-16:45

Paper P5.37 (Presenter at poster: 15:00-16:45)
Prosodic cues and degree of perceived foreign accents in learner English
Li, Bin; Cao, Wenling and Yan, Xiu
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Foreign accent is judged by the degree to which the non-native (L2) production is perceived differently from produc-

tion patterns by native speakers (NL) [1]. Both segmental and suprasegmental features are shown influential in accent perception by NL speakers or L2 learners [2]-[4]. However, roles of prosodic cues in the process are not well known yet. Our study aims to investigate the effects of intonation and speaking rate in foreign accent perception. We modified properties of the two cues in English utterances produced by NL and L2 speakers. Mandarin and Cantonese learners of English judged the degree of foreign accents. Results show that intonation had a stronger influence on accent rating in L2 than in native speech, while speaking rates affected judgement of L2 accents more. No differences were found between Cantonese and Mandarin L2 English samples, but Cantonese listeners seemed more sensitive to native English samples than Mandarin listeners did.

Paper P5.38 (Presenter at poster: 15:00-16:45)
The acquisition of Spanish lexical stress by Korean learners

*Hualde, José Ignacio and Kim, Ji Young
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We investigate the acquisition of Spanish lexical stress by native speakers of Korean. Korean is a language without lexical stress, where rising tone cues prominence at the phrase-level. Spanish has lexical stress. In a first experiment, we examined the production of pitch correlates of lexical stress. Our Korean participants' production was similar to that of native Spanish speakers for sentence-final words, but words in sentence-medial position showed a peak typically aligned near the end of the word, regardless of the position of the stressed syllable. This can be seen as a transfer from native Korean intonational patterns. In a second study we tested the perception of stress with minimal pairs in different intonational contexts. Overall, learners' accuracy was very low, and with a strong bias for penultimate stress. Performance was slightly better in citation forms.

Paper P5.39 (Presenter at poster: 15:00-16:45)
The impact of fluency and hesitation phenomena on the perception of non-native speakers by native listeners of German

*Reitbrecht, Sandra and Hirschfeld, Ursula
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The study presented here and ongoing addresses L2 fluency and hesitation phenomena in the context of speech effects in intercultural communication. It investigates the impact of fluency and hesitation phenomena on the perception of non-native speakers by native listeners of German. The first results underline the importance and salience of hesitation phenomena and fluency for speech effects and suggest a higher consideration of these features in future studies. Native recipients' verbal reactions to L2 speech material show that they often make reference to features of L2 utterance fluency to explain how they perceive non-native speakers, their personality and their emotional state. Furthermore, Spearman's rank correlation tests for a certain number of fixed perceptual categories prove significant correlations between perceived fluency and the attributes assured ($r(309)=0.617$, $p<0.01$), well prepared ($r(303)=0.589$, $p<0.01$), competent ($r(305)=0.483$, $p<0.01$), relaxed ($r(307)=0.375$, $p<0.01$)

and nervous ($r(309)=-0.322$, $p<0.01$).

Paper P5.40 (Presenter at poster: 15:00-16:45)
Strong influence of prosody on the perception of foreign accent

*Wei, Peipei; Gubbins, Lucy and Idemaru, Kaori
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This study investigates the acoustic characteristics of non-native speech which give rise to the perception of a foreign accent. Japanese speech samples were collected from L1 English and Mandarin speakers studying Japanese. The acoustic patterns of the L2 and native speech were related to the accentedness ratings of the speech provided by native Japanese listeners. Results indicate the important role that prosodic features play in affecting perception of foreign accent across different L1 backgrounds. They also indicate intriguing cross-linguistic differences: vowel production was related to English accent, whereas consonant production was related to Chinese accent in Japanese.

Paper P5.41 (Presenter at poster: 15:00-16:45)
Teaching Japanese bi-mora and quadric-mora timing rhythms to Vietnamese learners

*Taniguchi, Masaki and Setter, Jane
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Speech rhythm in Japanese is based around a unit of timing known as the mora. In this study, the Haiku, a Japanese poetic form, is used to help Vietnamese learners of Japanese improve their speech rhythm or, more specifically, their mora-timing, by using bi- or quadri-mora-timing as a pedagogic strategy. Following instruction, participants in the study showed improvement in the uniformity of the duration of individual morae produced, indicated by the range of standard deviation scores, and also improved in speed and fluency. This effect persevered when learners were tested a week later.

Paper P5.42 (Presenter at poster: 15:00-16:45)
Relative roles of three suprasegmental parameters in perceived degrees of foreign accent in Japanese

*Hirata, Yukari and Kato, Hiroaki
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This study examined perceived degrees of foreign accent using speech of second language learners and native speakers morphed to each other in terms of three suprasegmental parameters. Results indicated that duration and f0, but not intensity, are central to accuracy and accentedness of a simple Japanese sentence. The effects of these two parameters still existed even when we evaluate only 'accurate' utterances. Analysis of individual learners suggested that the relative roles of duration and f0 depended on the state of the learners' original utterances. The learners' stimuli modified and matched to the three parameters of native speakers were still rated as more accented than the original native stimuli. In addition, the native stimuli matched to all of the learners' acoustic parameters were still rated as less accented than the original learners' stimuli. These results indicate that segmental aspects of learners' speech significantly contribute to perceived accent as well.

Paper P5.43 (Presenter at poster: 15:00-16:45)
Acoustic features of Japanese words spoken by Japanese

natives and non-natives

*Yamakawa, Kimiko; Amano, Shigeaki and Kondo, Mariko
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To investigate acoustic feature differences between Japanese native- and non-native speakers in spoken Japanese, 29 Japanese words were digitally recorded by 10 each of Japanese, French, Korean, Thai, Taiwanese, and Vietnamese speakers. The results revealed that acoustic features in each language have different tendencies in relative duration, intensity, and fundamental frequency. For example, compared to Japanese natives, Thai and Vietnamese speakers had a tendency of longer relative duration for first and last vowels than Japanese speakers, French speakers had lower relative intensity for all vowels, and all non-native speakers had higher relative fundamental frequency for first vowels but lower relative fundamental frequency for last vowels. It is suggested that the characteristics of each language of non-native speakers cause respective effects on the production of Japanese speech.

Paper P5.44 (Presenter at poster: 15:00-16:45)
Language mode vs. L2 interference: Evidence from L1 Polish

*Schwartz, Geoffrey; Balas, Anna and Rojczyk, Arkadiusz
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Only a small amount of research has been devoted to the phonetics of code-switching in the speech of bilinguals. The studies that do exist have shown conflicting results with regard to the appearance and direction of cross-language interaction, and are limited in the types of participants and phonetic parameters that have been investigated. This paper presents both monolingual data and insertional code-switches from L1 Polish speakers that are highly proficient in English. The phonetic parameter of interest is glottalization vs. sandhi-linking of vowel-initial words. Linking is common in English, but rare in Polish, where glottalization is more prevalent. Results suggest that English style sandhi-linking does not interfere with boundary realization in the L1 in both monolingual and bilingual modes. Implications are discussed for models of L2 speech and the phonological status of the boundary effects under study.

Paper P5.45 (Presenter at poster: 15:00-16:45)
Phonetic encoding of coda voicing contrast and its interaction with information structure in L1 and L2 speech

*Choi, Jiyoun; Cho, Taehong; Kim, Sahyang; Baek, Yuna and Jang, Jiyoung
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This study examines the coda voicing effect in English on production of preceding vowel by comparing L1 and L2 speech. Particular attention is paid to how coda voicing contrast is encoded in temporal vs. spectral dimensions, how the effect interacts with information structure (with varying focus types), and how the use of information structure differs in L1 vs. L2. Both English (native) and Korean (non-native) speakers show a comparable pattern in the temporal dimension (vowel duration), but Korean speakers fail to encode the spectral attribute (vowel F1/F2) due to coda voicing. Furthermore, while native speakers make use of information structure in an efficient way that is accountable by the output-oriented and the system-oriented constraints,

non-native speakers do not use information structure as efficiently. Alongside the L1/L2 issues, a 'long-distance' coda voicing effect is observed on VOT of the preceding initial stop, which illuminates the nature of the coda voicing effect.

Paper P5.46 (Presenter at poster: 15:00-16:45)

Attention redistribution and segment-tone integration in Mandarin tone acquisition by L2 learners

*Zou, Ting; Chen, Yiya and Caspers, Johanneke
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This study investigates how beginning and advanced Dutch learners of Mandarin process Mandarin tonal information. An ABX matching to sample task is adopted to investigate the discrimination of tonal pairs, the redistribution of attention between segmental and suprasegmental information, and the integrality of segmental and suprasegmental dimensions. Results show a clear developmental path in tone learning. The advanced learners can discriminate Mandarin tonal contrasts effectively. Moreover, they have learned to redistribute their attention between segmental and suprasegmental information, and they process these dimensions in an integrated manner like a Mandarin native speaker. This indicates that the acquisition of new tonal categories in L2 involves a redistribution of attention along acoustic dimensions and the development of segment-tone integration

Paper P5.47 (Presenter at poster: 15:00-16:45)

What motivates extra-rising patterns in L2 French: Acquisition factors or L1 transfer?

*Santiago, Fabian and Delais-Roussarie, Elisabeth
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Learners of L2 French, be they German or Spanish, produce an extra-rising melodic movement (T*HH%) at the right edge of non-final IPs, whereas French native speakers do not produce such a form. From the analyses of a large data set extracted from a learner corpus, it appears that this non-native tonal pattern could not be attributed to an L1 transfer. Different factors are thus explored in order to explain the occurrence of such a form. The results show that: (i) the use of such rises is related to the learner level of proficiency, this form being unmarked at the beginning of the L2 acquisition process, and (ii) this tonal pattern could be a sign of linguistic insecurity.

Paper P5.48 (Presenter at poster: 15:00-16:45)

Acquisition process of L2 Japanese intonation by Swedish learners - Interlanguage or prosodic transfer?

*Nagano-Madsen, Yasuko
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This study examines the acquisition process of L2 Japanese intonation by Swedish learners at intermediate and advanced levels. Regarding the realization of L2 intonation as 'interlanguage', it focuses on the acquisition process of various parameters and their phonetic realizations that are relevant in determining Japanese intonation. The parameters can be phonological, syntactic, and discourse related. Which parameter is acquired first and which comes last? The results show the unique interlanguage structure at different stages of acquisition, and little evidence was found for a direct prosodic transfer from L1. The persistent difficulties

even at the advanced level were the exact phonetic realization of the two types of lexical pitch accents as well as that of information structure in Japanese.

Paper P5.49 (Presenter at poster: 15:00-16:45)

Patterns of prominence in L2: Observations from learners of Swedish with L1s of diverse prominence properties

Tronnier, Mechtilde and Zetterholm, Elisabeth

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Swedish has – like other Germanic languages – flexible stress placement, which underlies morphological rules and is also based on the individual word's origin. The achievement of the correct usage when learning Swedish is challenging. As second language learners of Swedish in the classrooms present speakers of a variety of first languages (L1s), the opportunity has been taken to have a closer look at how stress in L2 is handled. For that reason, learners with Somali, Albanian, Vietnamese and Farsi as their first language were recorded when speaking L2-Swedish. These languages exemplify a variety of systems in regard to the usage of stress. The recorded speech was analysed and the observed way of administering stress in L2 was compared to the organisation of stress in L1.

Paper P5.50 (Presenter at poster: 15:00-16:45)

Characterizing rhythm in the ESL production by Mandarin Speakers on both duration- and pitch-based measures

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An experiment is conducted to investigate rhythm in the ESL production of native Mandarin speakers. Rhythm is characterized not only by the traditional acoustic-rhythmic measures of duration, but pitch-based analysis is also used, which includes minimum and maximum F0s, pitch range, number of pitch rises and pitch slope. The results show that the ESL production has not met the native-speaking target on any of the nine acoustic measures, although it is closer to some than others. More specifically, the ESL production on durational measures suggests a consistent trend of an "interlanguage" whose durational values all fall between those of the L1 and L2. The pitch analysis yields varied results, some of which go outside the range between the L2 and L1 values.

08:00-18:00	Registration (<i>Hall 1</i>) and Exhibition (<i>Hall 2</i>)						Speaker room (<i>Etive</i>)	
09:00-09:45	9.1 Clinical Phonetics: Neurological Disorders		9.2 Assimilation	9.3 Learning Chinese	9.4 Syllabic and Prosodic Aspects of L2 Production	9.5 Nasality	9.6 Phonetics-Phonology Interface III	9.7 Speech Production: Models and Methods
09:45-11:30	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 4 (<i>Hall 1</i>)			
11:30-12:30	10.1 Training L2 Perception 10.2 Vowels, Dialects, and Speech Styles		10.3 Corpora and Databases	10.4 Acoustics of Prominence	10.5 Cochlear Implants	10.6 Stops and Voice Onset Time	10.7 Topics in Intonation I	
12:30-14:00	LUNCH			PCICPhS meeting & bids to host ICPHS XIX (<i>Aish 1&2</i>)				
14:00-15:00	11.1 Talker Variation and Identification	11.2 Perception of Prominence	11.3 Neurophonetics	11.4 Child Speech	11.5 L2 Perception	11.6 Rhotics	11.7 Topics in Intonation II	
15:00-16:45	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 5 (<i>Hall 1</i>)			
16:45-17:45	12.1 Sociophonetics II	12.2 Speaker Recognition	12.3 Topics in Language Acquisition	12.4 L2 Categories and Contrasts	12.5 Perception of Second Language Prosody	12.6 Voice Quality	12.7 Corpora and Statistical Models	
18:15-00:00	CONFERENCE PARTY AND CEILIDH (<i>Merchant Square</i>)							

DAY 5: Friday, August 14, 2015

ORAL SESSION 13

13.1: Clinical Phonetics: Vowels

Friday, August 14, 2015, 09:00-09:45, Carron 1

Chair: Joanne Cleland

Session 13.1, Paper 1 (09:00-09:15)

The effect of semantic predictability on vowel production with pure word deafness

Chang, Charles and Fischer-Baum, Simon

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Vowels tend to be reduced in words that are semantically predictable from context, an effect amenable to talker- or listener-oriented accounts of speech production. This study explored the role of perception in these accounts by testing for effects of semantic predictability on vowel production in the face of impaired speech perception (but otherwise normal hearing)—namely, in a patient with pure word deafness. Analysis of the patient's English vowels in read speech showed no effect of semantic predictability on vowel duration, but the expected effect on vowel dispersion: vowels tended to be less dispersed in predictable than in unpredictable words. Overall, these findings contradict listener-oriented accounts of reduction relying on stored exemplars or online perceptual modeling, suggesting instead that reduction arises due to talker-centric factors related to activation of long-term, abstract representations.

Session 13.1, Paper 2 (09:15-09:30)

Apraxia of speech (AOS): Effects of noise masking on vowel production in the DIVA model

Terband, Hayo; Rodd, Joe and Maas, Edwin

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Apraxia of Speech (AOS) is a motor speech disorder whose precise nature is still poorly understood. A recent behavioural experiment featuring a noise masking paradigm suggests that AOS reflects a disruption of feedforward control, whereas feedback control is spared and plays a more prominent role in achieving and maintaining segmental contrasts [10]. In the present study, we set out to validate the interpretation of AOS as a feedforward impairment by means of a series of computational simulations with the DIVA model [6, 7] mimicking the behavioural experiment. Simulation results showed a larger reduction in vowel spacing and a smaller vowel dispersion in the masking condition compared to the no-masking condition for the simulated feedforward deficit, whereas the other groups showed an opposite pattern. These results mimic the patterns ob-

served in the human data, corroborating the notion that AOS can be conceptualized as a deficit in feedforward control.

Session 13.1, Paper 3 (09:30-09:45)

Acoustic characterisation of vowel production by young adults with Down syndrome

Rochet-Capellan, Amélie and Dohen, Marion

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Down Syndrome (DS) is a frequent genetic disorder that has systematic consequences on speech articulation. The acoustic properties of speech production of people with DS have been poorly investigated in speech research. This paper reports on an acoustic analysis of vowels produced by eight native speakers of French with DS in Vowel-Consonant-Vowel (VCV) contexts. We observed more variability in duration, pitch and formants in vowels produced by people with DS compared with "ordinary" speakers. F0 was always higher for people with DS who also tended to display a larger vocalic space in VCV production than ordinary people. We interpret these results regarding motor control issues reported in previous studies involving people with DS.

13.2: Topics in Perception

Friday, August 14, 2015, 09:00-09:45, Lomond

Chair: Francesco Cangemi

Session 13.2, Paper 1 (09:00-09:15)

What causes the activation of contrastive alternatives, the size of focus domain or pitch accent type?

Braun, Bettina

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Theories of information structure argue that focus involves alternative sets; experimental studies have also shown that narrowly focused constituents lead to the activation of alternatives. However, narrow focus can be realized with different accent types, indicating the information status of the referent and it is unclear whether it is focus domain or accent type that conditions the activation of alternatives. In two visual-world eye-tracking experiments in German, we compared narrow focus conditions (Exp1: L+H*, Exp2: H+L*; narrow focus realized on the subject constituent) to a broad focus condition. We analysed participants' fixations to words that are contrastively related to the accented word while they processed the utterance. Results showed that contrastive associates were not generally fixated more in narrow focus conditions, but only when the narrow focus is realized with an L+H* accent, suggesting that accent type plays a stronger role than focus domain in the activation of contrastive associates.

Session 13.2, Paper 2 (09:15-09:30)

Feature-cue-based processing of speech: A developmental perspective

Shattuck-Hufnagel, Stefanie; Hanson, Helen M. and Zhao, Sherry Y.

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Over the past decades a number of research findings have illustrated the extraordinary robustness and flexibility of hu-

man speech perception, which combines sensitivity to surprisingly detailed aspects of systematic context-governed variability in word forms with an ability to extract information about the speaker's intended words from minimal information in a sometimes highly reduced signal. Stevens' [19] proposed model of human speech perception, based on the extraction of individual cues to distinctive features, provides an account of this robust perceptual processing in adults, and is also consistent with two recent findings about speech production during development in children learning American English: the occurrence of non-adult-like cues to the voicing contrast in coda stops, and the occurrence of adult-like cues in stop-like productions of voiced dental fricatives.

Session 13.2, Paper 3 (09:30-09:45)

Unbalanced adult production and perception in prosody

Lentz, Tomas and Chen, Aojia

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Previous work on the production and comprehension of focus-to-prosody mapping make different claims on the existence of a production-preceding comprehension asymmetry in acquisition, whereby children pass through a stage of producing the right prosodic pattern but not using the focus-to-prosody mapping to the fullest extent in their comprehension, before reaching adult-like behaviour in both. The question that arises is whether there is an asymmetry in adults' use of prosody to mark and interpret focus as well. We found that adults' production correlated negatively with their comprehension. This puzzling result can be explained by exploring the data: many participants performed at the expected 'adult' level in one of the two skills, but not in both. We have therefore shown for the first time that adults are not balanced in their production and comprehension of prosody, which has important implications for acquisition.

13.3: Sociophonetics III

Friday, August 14, 2015, 09:00-09:45, Boisdale 1

Chair: John Wells

Session 13.3, Paper 1 (09:00-09:15)

An evaluation of sociolinguistic elicitation methods

Boyd, Zac; Elliott, Zuzana; Fruehwald, Josef; Hall-Lew, Lauren and Lawrence, Daniel

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This study investigates the effects of different elicitation methods on the speech of a single speaker of San Francisco English who is participating in a systematic set of vocalic sound changes known as the California Vowel Shift [6]. We contrast data obtained from classic sociolinguistic interview methods with data from self-recordings, as well as data from various methods for eliciting spontaneous speech that are typically used in laboratory settings. An analysis of five sound changes indicates that self-recorded speech often results in significantly more advanced productions than interview speech, while speech from laboratory methods is largely comparable to interview speech. Surprisingly, differences between read speech and unscripted speech are minimal. We conclude by recommending the

utility of controlled-but-spontaneous laboratory elicitation methods, and by strongly recommending the use of self-recorded data for studies of sound changes in progress.

Session 13.3, Paper 2 (09:15-09:30)

Dynamic variation in 'Panjabi-English': Analysis of F1 & F2 trajectories for FACE and GOAT

Wormald, Jessica

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The vowels FACE /eɪ/ and GOAT /əʊ/ [33] have been reported as characteristic of British English contact varieties. FACE has been found to have a lower F1 and a higher F2. For GOAT, a lower F1 but varying F2 have been reported. The vowels also have shorter trajectories or monophthongal realisations [4, 7, 26, 29, 34]. The current paper considers dynamic data from 'Panjabi-' and 'Anglo-'English speakers in Bradford and Leicester. Within locations, speakers of Panjabi-English have significantly lower F1 values across trajectories for both vowels. F2 for Panjabi-English speakers is higher for FACE, and lower for GOAT. Although the two Panjabi-English communities share a heritage language, cultural and linguistic differences between the two mean this may not be an adequate explanation of the similarities observed. Instead, the results are considered in relation to consistencies with previous research which may provide evidence for the development of a supra-regional contact variety.

Session 13.3, Paper 3 (09:30-09:45)

An ultrasound analysis of low back vowel fronting in the Northern Cities Vowel Shift

Havenhill, Jonathan

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While the acoustic characteristics of the Northern Cities Vowel Shift (NCVS) are well documented, research on the articulatory components of this shift is comparatively limited. This study combines acoustic, video, and ultrasound analysis to examine the productions of seven Metro Detroit speakers and determine the relative contributions of lip configuration and tongue position to the production of fronted /a/ and /ɔ/. NCVS speakers are found to exhibit variation with regard to how this change is achieved articulatorily. While some speakers distinguish /ɔ/ from /a/ with a combination of tongue position and lip rounding, others do so using either tongue position or lip rounding alone. For speakers who maintain the contrast with only one articulatory gesture, /a/ and /ɔ/ are acoustically more similar than for speakers who use multiple gestures.

13.4: Artificial Languages and Auditory Illusions

Friday, August 14, 2015, 09:00-09:45, Boisdale 2

Chair: Maria Wolters

Session 13.4, Paper 1 (09:00-09:15)

A new artificial signal-space proxy for investigating the emergence of structure and categories in speech

Little, Hannah; Eryilmaz, Kerem and de Boer, Bart

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In order to experimentally investigate emergence of structure in speech, one needs a non-discretised signal space that is removed from participants' existing linguistic experience to prevent interference. We present a novel approach that makes use of an infrared sensor device. Participants generate signals using their hands in relation to the device, which generates audio feedback. The signalling space can be manipulated to have different sizes and to make use of different dimensions (e.g. distance to the device, or position with respect to it), and the nature of the audio feedback can also be manipulated. This paper will give a brief review of previous methods used as proxies for signalling spaces and outline why further innovation is required. We will also describe the new approach, drawing on examples, and outline future applications and possibilities within the field of phonetics and phonology, specifically in relation to the emergence of structure.

Session 13.4, Paper 2 (09:15-09:30)

Rhythmic segmentation in auditory illusions - Evidence from cross-linguistic monodegreens

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When confronted with non-native songs, listeners occasionally experience auditory illusions and perceive words in their native language although they are fully aware of the song lyrics being sung in a different language. We compiled two corpora with the original language of the song lyrics being English and the percept being either German or French. Against these two corpora, we tested the rhythmic segmentation hypothesis, specifically examining the cases of juncture misperceptions. The findings suggest that both German and French speakers use prominent syllables as anchors for segmentation, but they do so in language-specific ways. For German listeners, prominent syllables signal the onset of lexical words. For French listeners, prominent syllables indicate phrase-finality. This cross-linguistic difference in boundary cueing corresponds with the specific role of prominent syllables in these languages, and makes a strong case for the concept of native listening in the context of sung speech.

Session 13.4, Paper 3 (09:30-09:45)

Speech segmentation is adaptive even in adulthood: Role of the linguistic environment

Namjoshi, Jui; Tremblay, Annie; Spinelli, Elsa; Broersma, Mirjam; Martínez-García, María Teresa; Connell, Katrina; Cho, Taehong and Kim, Sahyang
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In this paper, we show that adult listeners who speak the same native language but live in different linguistic environments differ in their use of prosodic cues that signal word boundaries in the native language. Non-utterance-final word-final syllables have higher fundamental frequency in French. Adult native French listeners living in France or in the US completed an artificial-language segmentation task where fundamental frequency cued word-final boundaries (experimental). Other native French listeners living in France completed the corresponding task without prosodic cues (control). Results showed that France French listeners outperformed US French listeners and control French lis-

teners, but US French listeners did not outperform control French listeners. The poorer performance of US French listeners is attributed to their regular exposure to (and thus interference from) English, a language where fundamental frequency signals word-initial boundaries. This suggests speech segmentation is adaptive, with listeners tuning in to the prosody of their linguistic environment.

13.5: Tone in Varieties of Chinese

Friday, August 14, 2015, 09:00-09:45, Dochart 1

Chair: Bob Ladd

Session 13.5, Paper 1 (09:00-09:15)

Tonation in three Chinese Wu dialects

Rose, Philip

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Auditory, acoustic and limited physiological data are presented, together with audio, to describe different types of interaction between citation tone pitch and breathy, whispery, growly and creaky phonation type in three varieties of Wu Chinese: Lóngyóu, Yōngjiāng, and Jìnyún. Interaction in both lexical and verb-object tone sandhi is briefly described for the last two varieties.

Session 13.5, Paper 2 (09:15-09:30)

Tone sandhi and tonal coarticulation in Fuzhou Min

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This study examines the completeness of Fuzhou tonal neutralisation and its interaction with tonal coarticulation. In Fuzhou, Tone 44, 242 and 53 are allegedly neutralised into Tone 44 preceding Tone 53. Acoustic data, analysed with Linear Mixed Modelling, show no significant difference in pitch height between neutralised tones, suggesting complete neutralisation in production. A forced-choice identification test reveals that Fuzhou speakers are unable to distinguish these neutralised tones perceptually. Further acoustic data show how the output of categorical tone sandhi may be modified by tonal coarticulation, with dissimilatory effects superimposed on the sandhi tone.

13.6: Dialectology

Friday, August 14, 2015, 09:00-09:45, Carron 2

Chair: Justus Roux

Session 13.6, Paper 1 (09:00-09:15)

Vowel convergence and divergence between two Swiss German dialects

Ruch, Hanna

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Short-term accommodation is considered as one of the main factors in dialect levelling and the spread of linguistic innovations. This study investigates how speakers of Grison and Zurich German - two Swiss German dialects - shift their

productions of short vowels after being exposed to each other's dialect in a dialogue. We found asymmetrical behaviour in accommodation between the two dialects. On the whole, speakers from Zurich converged towards Grison German, while Grison speakers tended to diverge from Zurich German. The degree of accommodation for both dialects was most marked in low vowels in words that also served as stimuli in the dialogue. The findings confirm lexical effects found in previous studies and suggest that phonetically more distant vowels are more prone to accommodation.

Session 13.6, Paper 2 (09:15-09:30)

Regional variation of Saterland Frisian vowels

*Schoormann, Heike; Heeringa, Wilbert and Peters, Jörg
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This paper reports on the acoustic investigation of Saterland Frisian vowels, including their regional variation. The study aims at identifying merged vowel categories as well as supplementary acoustic dimensions, which enhance the discrimination of spectrally adjacent categories. All vowels were elicited in a /hVt/ frame. Acoustic measurements included vowel duration, mid-vowel F1 and F2, Vowel Inherent Spectral Change (VISC) [16], and the spectral rate of change [10]. Results confirm large inventories for the varieties of Saterland Frisian, although some vowel categories have undergone a merger. The comparison of spectral features of single vowel categories in the three varieties revealed an effect for Scharrel, in which most monophthongs are more centralized in the F1 dimension than in Strücklingen. These findings are discussed in light of the natives' perception of regional differences in speech rate.

Session 13.6, Paper 3 (09:30-09:45)

Crowdsourced mapping of pronunciation variants in European French

*Scherrer, Yves; Boula de Mareüil, Philippe and Goldman, Jean-Philippe
yves.scherrer@gmail.com*

This study aims at renewing traditional dialectological atlases to provide a mapping of pronunciation variants by using crowdsourcing. Based on French spoken in France, Belgium and Switzerland, it focuses on mid vowels whose quality may be open or close and shibboleths such as final consonants which may be maintained or deleted, as a function of speakers' backgrounds. Over 1000 subjects completed a questionnaire in which they were asked which one of the two possible pronunciations was closer to their most usual pronunciation. Their responses for 70 French words are displayed in the form of maps. This graphical layout enables the general public and phoneticians to readily visualise where phonological constraints such as the "loi de position" are violated.

13.7: Prosody of Sentence Mode

Friday, August 14, 2015, 09:00-09:45, Alsh

Chair: Oliver Niebuhr

Session 13.7, Paper 1 (09:00-09:15)

Focal F0 peak shape and sentence mode in Swedish

*Ambrazaitis, Gilbert; Buanzur, Tuarik Cassimo and Niebuhr, Oliver
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Shape characteristics of rising-falling accentual F0 peaks of Stockholm Swedish Accent I words in narrow focus are studied in a corpus of 287 read sentences. The corpus includes statements and three types of polar questions. Results reveal a clear effect of sentence mode on the shape of the accentual rises: Statements are predominantly characterized by convex rises, questions by concave rises.

Session 13.7, Paper 2 (09:15-09:30)

Sentence mode differentiation in four Donegal Irish varieties

*Dorn, Amelie and Ni Chasaide, Ailbhe
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This paper discusses how sentence mode is marked in four local varieties (RF, BF, GCC, RG) of Donegal Irish. The analysis covers tunes (pre-nuclear and nuclear) as well as phonetic modality markers, distinguishing between statements (ST) and two question types (WHQ, YNQ). Results show that across the four varieties sentence mode can be signalled by intonation, but tune differences are optional and not obligatory. One variety (RG) stands out from the others by a preference in L*+H L% in nuclear and H* IP-initial pre-nuclear pitch accents across ST, WHQ and YNQ. RF, BF and GCC, on the other hand, group together in having L*+H % as their first choice in nuclear tunes. The same phonetic markers, however, are used by speakers of all varieties. The sentence mode differentiation includes a boosting of the pre-nuclear part of the phrase for WHQ and a boosting of the nucleus in YNQ.

Session 13.7, Paper 3 (09:30-09:45)

The prenuclear field matters: Questions and statements in standard modern Greek

*Baltazani, Mary; Kainada, Evia; Nicolaidis, Katerina and Lengeris, Angelos
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Within the AM model of intonational phonology, nuclear rather than prenuclear pitch accents typically monopolize our interest as the purported pivots for meaning distinctions among utterances. This paper compares, through one production and two perception experiments, the prenuclear field in statements versus polar questions in Greek, which can be string identical, differing only in intonation. Systematic differences in the prenuclear pitch accents of these two utterance types were found in both their peak alignment and scaling. Moreover, identification and discrimination experiments showed that listeners were attuned to these differences. These results underline the importance of research on the phonetics and phonology of prenuclear pitch accents and their contribution to the meaning of utterances.

13.8: Arabic Phonetics*Friday, August 14, 2015, 09:00-09:45, Dochart 2**Chair: Eleanor Drake*

Session 13.8, Paper 1 (09:00-09:15)

The primary articulation of plain-emphatic /s/-/s^f/ in Lebanese Arabic: An EMA study*Hermes, Zainab; Wong, Nicole; Loucks, Torrey and Shosted, Ryan**zherme2@illinois.edu*

The phonemic inventory of Arabic includes a plain-emphatic contrast in a number of coronal stops and fricatives. The emphatic members in these contrastive pairs are articulated with a secondary posterior constriction in the velopharyngeal region of the vocal tract. This secondary constriction is absent in the plain counterparts. The primary constriction is also believed to differ in the plain-emphatic pairs. This study examines the differences in the primary articulation of the plain-emphatic voiceless alveolar fricatives /s/-/s^f/ in Lebanese Arabic as reflected in the configuration of the tongue blade. Findings suggest that the tongue blade is lower during /s^f/ than during /s/. There is also evidence for tongue blade concavity during /s^f/, a configuration not assumed during /s/.

Session 13.8, Paper 2 (09:15-09:30)

Gestural coordination differences between intervocalic simple and geminate plosives in Moroccan Arabic: An EMA investigation*Zeroual, Chakir; Hoole, Philip; Gafos, Adamantios I. and Esling, John H.**chakirzeroual@yahoo.fr*

Based on EMA data (3 speakers), we investigate the articulatory strategies responsible for the singleton/geminate plosive contrast in Moroccan Arabic. Our data showed that closing and opening phases of the geminate gesture share several articulatory properties with those of its single cognate. These results and our analyses of V-to-V and V-to-C temporal coordination are consistent with the hypothesis that MA geminate plosives can be analysed as two identical overlapped consonants.

Session 13.8, Paper 3 (09:30-09:45)

F0 peak alignment in Moroccan Arabic polar questions*Hellmuth, Sam; Louriz, Nabila; Chlaihani, Basma and Almbark, Rana**sam.hellmuth@york.ac.uk*

This paper contributes phonetic evidence to ongoing debate regarding the position of Moroccan Arabic in prosodic typology, with the aim of determining how phrase-edge tonal events should be represented in the intonational phonology of the language. A salient phrase-final rise-fall tonal event, found in MA polar questions, is used as a case study. We examined the alignment of the f0 peak of this tonal movement, relative to potential landmarks in prosodic structure, in a set of 112 polar questions extracted from a corpus of read and spontaneous speech collected in Casablanca. A comparison

of f0 peak alignment in tokens containing an unstressable final CV syllable vs. a stressable final CVC syllable suggests that the rise-fall tonal event observed in MA polar questions is best understood as a pitch accent marking prominence at the phrasal level.

POSTER SESSION 6**Speech Perception III: Speaker and Social Attributes***Friday, August 14, 2015, 09:45-11:15*

Paper P6.1 (Presenter at poster: 09:45-11:15)

Language exposure benefit to talker learning in an unfamiliar language*Orena, Adriel John; Theodore, Rachel and Polka, Linda
adriel.orena@mail.mcgill.ca*

Recent research shows that exposure to an unfamiliar language is sufficient in improving talker learning. Here, we further investigated the nature of this effect by exploring individual differences and methodological issues. Two groups of English-monolingual adults were recruited: one with regular exposure to French (Montréal), and the other without (Storrs). Both groups learned the voices of English talkers faster than French talkers; however, in contrast to previous findings, no group differences were found in talker learning, which may be due to task differences (4-AFC vs. 2-AFC task). However, stable patterns in individual differences emerged: performance in identifying English talkers was correlated with performance in identifying French talkers for Storrs residents, but not for Montréal residents. These findings suggest that a language-general "talent" contributes to talker learning only in encounters with highly novel languages, and that exposure to the surface acoustic-phonetic properties of an unfamiliar language drives the language exposure benefit.

Paper P6.2 (Presenter at poster: 09:45-11:15)

Fundamental frequency and human perception of alcoholic intoxication in speech*Baumeister, Barbara and Schiel, Florian
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The majority of speakers raise their fundamental frequency when speaking while intoxicated. In this study we describe three perception experiments based on manipulated sober and intoxicated speech from the German Alcohol Language Corpus to answer the question whether human listeners use fundamental frequency as a cue to recognize an intoxicated person. Our results show that although fundamental frequency is a good indicator for intoxication, listeners do not predominantly use this feature. A possible explanation is that fundamental frequency is also influenced by other speaker states such as fatigue, mood etc.

Paper P6.3 (Presenter at poster: 09:45-11:15)

Intonation as a cue to emotional speech perception: An

experiment with normal and delexicalised speech

Oliveira Peres, Daniel

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This study aims to investigate the role of intonation in the perception of emotion in spoken Brazilian Portuguese (BP). Recordings of 32 BP speakers were downloaded from the internet and presented to 36 listeners divided equally into two nationality groups (Brazilian vs. English). The participants performed two perception experiments, one based on normal speech and the other on delexicalised (lowpass-filtered) speech. Aspects of the speakers' productions were subjected to automatic analysis and compared to the listeners' judgments. The results show that: (i) Brazilians perform well in the normal speech condition, while the English participants' performance is moderately accurate; (ii) for both groups, performance was lower in the delexicalised speech condition; (iii) simple and multiple linear regressions show that median F0, F0 dispersion, the duration of intonation units, and related parameters can predict the perception of emotional speech by native and non-native speakers of BP.

Paper P6.4 (Presenter at poster: 09:45-11:15)

Investing in accents: How does experience mediate trust attributions to different voices?

Torre, Ilaria; Goslin, Jeremy and White, Laurence

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Speakers' accents have been claimed to influence initial judgements of personality traits, such as trustworthiness. We examined how personal experience with specific accents may serve to modify initial trust attributions, using an iterated trust game in which participants make investments with virtual players. The virtual player's accent was either Liverpool English or Standard Southern British English (SSBE), and they systematically returned investments either generously or meanly. When the virtual player was generous, participants consistently invested more with the SSBE-accented player throughout the game. When the virtual player was mean, participants initially invested more with SSBE, but after a few rounds the pattern reversed, and they subsequently invested more with the Liverpool-accented player, even though the pattern of investment returns between accents was the same. This interaction suggests that initial voice-based personality attributions may mediate the interpretation of a speaker's subsequent behaviour.

Paper P6.5 (Presenter at poster: 09:45-11:15)

Perception of prosodic social affects in French: A free-labeling study

Guerry, Marine; Rilliard, Albert; Shochi, Takaaki and Erickson, Donna

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This work aims at using a free labeling method as a reliable way to show the complexity of the concepts induced in listeners by audiovisual prosodic attitude performances in French. The experiment was conducted on 16 French social affective expressions in an audiovisual context. 27 native French listeners participated in the experiment. Subjects were asked to write down one word that best describes the expression of each stimulus. Results show that among these 16 communication situations, listeners are able to find consistent labels to name the expressivity and form coherent

clusters, as far as the intended expression is concerned.

Paper P6.6 (Presenter at poster: 09:45-11:15)

Perceptual evaluation of spoken Japanese attitudes

Shochi, Takaaki; Fourer, Dominique; Rilliard, Albert; Rouas, Jean-Luc and Guerry, Marine

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The aim of the present work is to investigate whether Japanese listeners can recognize before the end of an utterance various social affective meanings expressed by a speaker. 28 native Japanese subjects participated in the experiment. For this experiment, one sentence consisting of 3 moras is uttered in 8 different social affects. Each affective expression is produced by 4 native Japanese speakers (2 male, 2 female) who are selected as the best performers by native listeners. These 16 utterances are segmented in three sections (gates), that correspond to the three moras, adding white noise after a given gate position. The results show a significant effect of gate on recognition scores.

Phonetics of First Language Acquisition

Friday, August 14, 2015, 09:45-11:15

Paper P6.7 (Presenter at poster: 09:45-11:15)

The acquisition of English sibilant fricatives by children with bilateral cochlear implants

Reidy, Patrick; Beckman, Mary E.; Litovsky, Ruth and Edwards, Jan

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The English sibilant fricatives /s/ and /ʃ/ are acquired late by normal hearing (NH) children, and pediatric cochlear implant (CI) users lag even further behind their NH peers. Previous work on the acquisition of sibilant fricatives by children with CIs has focused on their performance relative to NH controls, but the developmental trajectory of their sibilant fricative acquisition has not been investigated explicitly. Productions of /s/ and /ʃ/ by children with bilateral CIs were analyzed with Dirichlet regression models in order to determine how their hearing experience and vocabulary development predict their accuracy and error patterns. Hearing age (i.e. total duration of CI use) best predicted the acquisitional trajectories. Neither age at implantation nor chronological age significantly improved the model fit, although receptive vocabulary score did.

Paper P6.8 (Presenter at poster: 09:45-11:15)

Adults' and infants' perception of infant-directed speech and song

Falk, Simone and Tsang, Christine

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Infant-directed speech, also sometimes described as "musilanguage", has acoustic characteristics overlapping with those of infant-directed singing. In the present contribution we determine whether native-English speaking adults and infants from native -English speaking households discriminate between infant-directed speech and song in a non-native language and which acoustic features are typical of their speech or song perception. Twenty four native-English

speaking adults rated Russian speech and song samples taken from naturalistic infant-directed recordings. Furthermore, 32 infants (6 to 9 months) were tested in a headturn preference procedure on a selection of the stimuli rated by adults. Results showed that both infant and adults discriminated between infant-directed speech and singing in a foreign language. In adults, tempo and pitch variability accounted for perceived differences. Moreover, infants, independently of age, attended longer to song than to speech – an intriguing result underlining the importance of studying infant-directed singing and its role for early linguistic development.

Paper P6.9 (Presenter at poster: 09:45-11:15)

Implosive and prenasalized consonant-like sounds in babbling

*Cissé, Ibrahima Abdoul H.; Vallée, Nathalie and Mous, Maarten
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This paper reports an analysis of the production of implosive and prenasalized sounds by 6 children (3 Fulfulde and 3 Bambara) from the onset of babbling to the end of their first year. It shows that the production of implosive consonant-like sounds by the children is very early on language-specific i.e. related to the presence of these consonants in the language the children are exposed to. Unlike the implosive consonant-like production, the prenasalized consonant-like sounds show no language-specific trend. Thus, in this cross-linguistic study on Fulfulde and Bambara children's babbled utterances, the implosive sounds are markers of early specialization in consonants' production by children exposed to these two languages.

Paper P6.10 (Presenter at poster: 09:45-11:15)

Spectral moments analysis of /s/ coarticulation development in Finnish-speaking children

*Körkkö, Pentti
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In Finnish, coarticulatory effects of vowels readily appear in the production of the fricative /s/(S). In this developmental study, spectral moments analysis was used to compare young children's productions of S in symmetrical vowel (V) contexts (e.g. /iSi, uSu, ySy, aSa/) with similar adult productions. The subjects were children in three age groups while adult speakers served as a control group. Spectral moments were computed at 11 equidistant time-points in the subjects' S tokens which were highpass-filtered at 700Hz. The results revealed that there were significant differences in the effects of vowel context on the acoustics of S between adults and children and also between the 3 groups of children. The findings suggest that there are salient developmental stages in children's progress toward adult-like phonetic realisations of S and that adult-like phonetic features of sibilants may appear in children's speech somewhat later than generally assumed.

Paper P6.11 (Presenter at poster: 09:45-11:15)

Complex onsets in child language acquisition

*Cristófaro Silva, Thaís and Miranda, Izabel
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This paper examines the emergence of complex onsets in Brazilian Portuguese (BP).¹ As with other languages, com-

plex onsets in BP appear at a later stage in language acquisition. A very common strategy used by children when acquiring complex onsets is to present a single consonant. Thus, a word such as [pr]ato is typically transcribed as [p]ato for 'prato' plate. In this paper we suggest that phonetic transcripts do not capture the rich and detailed content observed in languages and in child language acquisition in particular [7]. We will show that children make use of vowel duration to express the contrast between single and complex onsets as a case of covert contrast [3,5,8]. The main issue to be addressed in this paper concerns the nature of fine phonetic detail involved in the emergence of complex onsets by children who cannot produce them. The major contributions of this paper are: to discuss a case of covert contrast that applies to several children; to consider covert contrast involving syllables rather than segments and to contribute to the proposals which claim that detailed phonetic information is crucial for building phonological representations [1,2,6].

Paper P6.12 (Presenter at poster: 09:45-11:15)

VOT Production among schoolchildren in Francophone vs. French immersion schools in Anglo-dominant Southern Alberta

*Turner, Justin; Li, Fangfang; Rosen, Nicole and Netelenbos, Nicole
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The present study reports a speech production experiment on children who are enrolled in a Francophone K-12 school in Southern Alberta, Canada, a predominantly English-speaking region. Students from grades 1, 3, and 5 were asked to produce a series of French words beginning with one of the six stop consonants (voiced /b/, /d/, & /g/; voiceless /p/, /t/, & /k/). Results revealed no age-related difference across the three grades. Furthermore, when compared with previous research on children who are native speakers of Quebec French, these Francophone schoolchildren produced voiceless stops with native-like values but voiced stops with values closer to English. Their stop productions were also compared with a recent study on students from a local French immersion elementary school, who produced both voiced and voiceless stops with English-like values. The results thus illustrate the effects of the social as well as the educational context in bilingual children's speech production.

Paper P6.13 (Presenter at poster: 09:45-11:15)

The effects of lip rounding on voice onset time production in children acquiring Hungarian

*Zajdó, Krisztina
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The goal of this project was to examine the effects of lip rounding on the production of voice onset time in voiceless bilabial stops in children acquiring Hungarian as their first language. The duration of voice onset time in stops followed by or embedded between high back rounded phonologically long vowels with prominent lip protrusion are considerably longer. They are longer than vowels followed or surrounded by phonologically short front mid rounded vowels with less lip protrusion or high front unrounded vowels with no lip protrusion. Developmental trends in VOT acquisition are discussed.

Paper P6.14 (Presenter at poster: 09:45-11:15)
The acquisition of gemination in Lebanese-Arabic children
Khattab, Ghada and Al-Tamimi, Jalal
ghada.khattab@newcastle.ac.uk

This is the first study on the acquisition of gemination in Arabic, a phonological aspect that is prominent in the adult phonology yet complex in terms of its implementation and interaction with the grammar. The study reports on the longitudinal development of five Lebanese children in the second year of life and enables the authors to trace the transition from phonetic to phonological acquisition in the child. An acoustic investigation of consonant duration in the children's emerging lexicon shows very little distinction between short and long targets in the early stages, followed by rapid word learning and the beginnings of target-like durational patterns. However, the language-contact situation in Lebanon creates an interesting challenge for geminate acquisition; variable phonetic lengthening of medial consonants in French and English loan words in the input creates a fuzzy category which the children need to interpret alongside their unstable representations for Arabic.

Paper P6.15 (Presenter at poster: 09:45-11:15)
Indexical and linguistic processing in infancy: Discrimination of speaker, accent and vowel differences
Escudero, Paola; Bonn, Cory D.; Aslin, Richard N. and Mulak, Karen E.
paola.escudero@uws.edu.au

Infants preferentially discriminate native speech-sound categories prior to acquiring a large receptive vocabulary, implying a major role for distributional learning strategies in phoneme learning. However, it is unknown how infants extract the vowel phonemes of their language from distributional information in the presence of between-speaker variability in vowel realizations. Before we can ask this question, we must determine whether both indexical and linguistic cues are available to infants in speech processing. We familiarized infants to tokens of a vowel produced by one speaker, and tested their listening preference to trials containing a vowel change produced by the same speaker (linguistic information), and the same vowel produced by a speakers of the same or a different accent (indexical information). Infants noticed linguistic and indexical differences, suggesting that both are salient in infant speech processing. Further research should explore how infants weight these cues in distributional learning of vowel categories.

Speech Prosody III: General
Friday, August 14, 2015, 09:45-11:15

Paper P6.16 (Presenter at poster: 09:45-11:15)
Different parts of the same elephant: A roadmap to disentangle and connect different perspectives on prosodic prominence
Wagner, Petra; Origlia, Antonio; Avesani, Cinzia; Christodoulides, George; Cutugno, Francesco; D'Imperio, Mariapaola; Escudero Mancebo, David; Gili Fivela, Barbara;

Lacheret, Anne; Ludusan, Bogdan; Moniz, Helena; Ní Chasaide, Ailbhe; Niebuhr, Oliver; Rousier-Vercruyssen, Lucie; Simon, Anne-Catherine; Šimko, Juraj; Tesser, Fabio and Vainio, Martti
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Prosodic prominence is an umbrella term encompassing various related but conceptually and functionally different phenomena such as phonological stress, paralinguistic emphasis, lexical, syntactic, semantic or pragmatic salience, to mention a few. Due to the high interest prominence has received from various disciplines, it has been studied from multiple perspectives (functional, physical, cognitive). It also has been operationalised and annotated across different descriptive levels (syllable, word), based on different scales (categorical, multi-level, continuous), and measured across a large variety of signal domains (acoustic, articulatory, gestural). The present paper offers an overview of the various perspectives involved and defines a preliminary roadmap for a better and more unified understanding of this multi-faceted phenomenon.

Speech Perception III: Similarity and Confusability
Friday, August 14, 2015, 09:45-11:15

Paper P6.17 (Presenter at poster: 09:45-11:15)
A perceptual account for Cantonese vocative reduplication
Luo, Qian; Durvasula, Karthik and Lin, Yen-Hwei
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Both phonological and morphological reasons have been suggested to account for mismatched elements in reduplicative outputs (e.g. gbóná is reduplicated as gbí-gbóná in Yoruba). However, the mismatched tonal sequences in Cantonese vocative reduplication are not amenable to either account (namely, the Emergence of the Unmarked account and the Morphological Doubling Theory account). This study proposes a third reason – maximizing perceptual similarity in the presence of other prosodic factors. We present the results of a perceptual experiment that support the crucial prediction of the perceptual similarity account – that the two copies in the reduplicative complex have the greatest perceptual similarity among all relevant competitors.

Paper P6.18 (Presenter at poster: 09:45-11:15)
A new proposal for metric in perceptual multidimensional scaling
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We analyze a simplified probability model that assumes normality and homoscedasticity of vowel parameters' distributions. We arrive at explicit formulae that describe functional relationship between a natural Euclidean distance function in the model and the confusability of vowel categories. We propose a solution to address a common case when confusability of a pair of vowel categories is very low, which leads to uncertainty of distance value. The solution is applicable when the class boundary is provided by a real-valued

discriminating function. Examples of perceptual vowel diagrams obtained with new metric are presented based on vowel samples spoken by male speakers from the TIMIT corpus.

Paper P6.19 (Presenter at poster: 09:45-11:15)
On the role of discriminative intelligibility model for speech intelligibility enhancement

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This paper uses listening tests to directly evaluate two speech pre-enhancement algorithms that were published in earlier work. The models were previously evaluated using purely objective measures. The methods under study aim to increase speech intelligibility by applying an adaptive spectral shaping filter to the speech signal. In both algorithms the shape of the filter is adapted so as to maximise the intelligibility predicted by an objective intelligibility model. The first algorithm uses 'glimpse proportion' as the measure of intelligibility (i.e. assuming intelligibility is proportional to the extent of energetic masking). In contrast, the second optimises the score of a statistical 'microscopic' intelligibility model that measures the degree of discrimination between the correct interpretation and competing incorrect interpretations of the utterance. Results show that a significant intelligibility gain is obtained when the simple energetic masking model is employed, whereas the discriminative model currently fails to provide any intelligibility improvement.

Paper P6.20 (Presenter at poster: 09:45-11:15)
Intelligibility of foreign-accented words: Acoustic distances and gradient foreign accentedness

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Intelligibility and degree of accentedness are interrelated aspects of non-native speech. Previous research suggests that foreign accentedness is influenced by phonetic distance measures [7]. These distance measures may also influence the intelligibility of individual words. In the present study we further investigate the relationship between the intelligibility of native-and Mandarin-accented English words and acoustic distance measures (both spectral and temporal). We also examine the functional relationship between intelligibility and ratings of foreign accentedness assigned to the same words. Intelligibility was based on transcription accuracy scores and acoustic distances were based on formant and duration measurements in relation to mean values from a set of native talkers. The results indicate that temporal and spectral distances influence word intelligibility and that the functional relationship between intelligibility and accentedness is non-linear.

Paper P6.21 (Presenter at poster: 09:45-11:15)
Perceptual confusability of Mandarin sounds, tones and syllables

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This paper reports a perceptual identification study for Mandarin sounds, tones and whole syllables, using phonotactically plausible non-word stimuli covered in white noise. The results showed that while the accuracy of whole-syllable

identification could be estimated by the independent accuracy of initial and final identification, syllable-level confusability patterns were related to, but not fully predictable from the confusability patterns of initials and finals. Implications of the results on modeling Mandarin phonological neighborhoods are also discussed.

Paper P6.22 (Presenter at poster: 09:45-11:15)

Reciprocal measures of perceptual similarity

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This paper reports the results of two experiments aimed at assessing the perceived similarity between a set of English and Catalan vowels from the perspective of native speakers of both languages. Two groups of 27 listeners, a group of native English speakers and a group of native Catalan speakers, used a 9-point scale to rate the degree of similarity between two stimuli. Crucial stimuli consisted of English-Catalan vowel pairs. The experiments also included same-category pairs from a single language. The results of the experiments showed that some mixed-language vowel pairs obtained similarity ratings that fell within the range of same-category single-language pairs, revealing a perceptual overlap for some native and non-native phonetic categories. Further, Catalan listeners provided overall higher dissimilarity ratings than English listeners did, showing no relationship between smaller inventory size and greater within-category variability. The outcomes are discussed in terms of the resulting predictions for second language perception.

Paper P6.23 (Presenter at poster: 09:45-11:15)

Manner asymmetries in the perception of laryngeal contrast: A noise-masking experiment in Russian

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The issue of the effect of consonant manner on the perceptibility of laryngeal contrast was addressed. Previous studies of perceptual confusion suggest that, in noise, the laryngeal contrast in fricatives is more difficult to perceive than stops for listeners in English, which is typologically classified as an "aspirating" language. The present study examined whether a similar pattern is observed in Russian, which is typologically classified as a "true-voice" language. Native listeners of Russian identified voiced and voiceless obstruents in Gaussian white noise conditions. The results demonstrate that voicing in stops is more confused than that in fricatives in noise, indicating a trend that is the opposite of that observed for English. The results suggest that the pattern of manner asymmetries in the perception of laryngeal contrast is not universal.

Phonetics of Conversation and Dysfluent Speech

Friday, August 14, 2015, 09:45-11:15

Paper P6.24 (Presenter at poster: 09:45-11:15)

Speech rate plays marginal role in processes of connected speech

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The study seeks to establish the frequency of occurrence for processes of connected speech and to examine the role of rate, hypothesizing that high rate fosters processes. Auditory and acoustic analysis was performed on 4.5 hs of speech of 9 speakers of Lancashire from the Phonologie de l'Anglais Contemporain corpus (PAC). As for the first aim, the following ranking emerges: /d/ deletion (34%), /t/ deletion (31%), /h/ deletion (20 %), fricativization (9%), yod coalescence (3%) and assimilation of place (2%). This hierarchy of occurrence can be explained with the two factors: lexical frequency and interspeaker variability. A surprising finding is that rate effects, with the exception of /t/ deletion, were not observed for individual processes or across the gradient/categorical division, pointing to a less significant role of tempo than is assumed. Instead, it is suggested that connected speech processes are phonological, not phonetic.

Paper P6.25 (Presenter at poster: 09:45-11:15)
Spontaneous speech production by dysarthric and healthy speakers: Temporal organisation and speaking rate

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This study compares speaking rate in spontaneous speech between dysarthric and healthy speakers. Since dysarthria involves heterogeneous pathologies, two types of dysarthria (i.e. Parkinson's disease and amyotrophic lateral sclerosis) have been distinguished. We hypothesize that temporal organisation of speech may be different between healthy and dysarthric speakers, but also between both pathological populations. Four measurements have been explored. Results show that Parkinsonian speakers are characterized by a short Inter-Phrasal Unit (IPU) while word duration is similar to healthy speakers. Amyotrophic Lateral Sclerosis speakers produced long words while IPU duration is similar to healthy speakers. Number of words per IPU distinguishes healthy speakers from dysarthric speakers while number of syllables per second separates Amyotrophic Lateral Sclerosis speakers from Parkinsonian speakers. These results suggest that the boundary between pathological and healthy speech should be examined with multidimensional analyses.

Paper P6.26 (Presenter at poster: 09:45-11:15)
Phonetic evidence for two types of disfluency

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Disfluency, such as pause (silences), filled pause (e.g. 'um', 'uh'), repetition (e.g. 'the the') and cutoff word (e.g. 'hori[zontal]'), is a common part of human speech that occurs at a rate of 6 to 10 per 100 words [2, 5]. According to one model of speech production [8], there are two types of disfluency: disfluency at the internal planning stage (e.g. word-retrieval difficulties), and disfluency at the external monitoring stage (e.g. self-correction of speech errors). The current study provides phonetic evidence for the two types of disfluency by examining word durations before different types of disfluency in the Switchboard corpus [6]. The results showed only a marginal increase in the durations of words before cutoffs, but a large increase in the durations of words before repetitions, silences and filled pauses, sug-

gesting internal processing difficulty before non-cutoff disfluency, but not before cutoff disfluency.

Paper P6.27 (Presenter at poster: 09:45-11:15)

Jumping out of context – Jumping out of tone

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The study presented here investigates how different degrees of conceptual integration, as predicted by direct and indirect reported speech, affect speakers' prosodic behaviour in interaction. It makes a three-way distinction between authentic direct, false direct and indirect reported speech and predicts that greater conceptual distance, predicted by authentic direct reported speech, will lead to a greater deviation from the speaker's prosodic habitus with respect to register shifts, while the greater conceptual integration assumed in indirect reported speech will lead to greater prosodic integration.

Speech Corpora and Big Data

Friday, August 14, 2015, 09:45-11:15

Paper P6.28 (Presenter at poster: 09:45-11:15)

Position-dependent vowel reduction in Russian

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The present paper deals with the problem of quality and quantity change (reduction) of unstressed vowels in Russian depending on their position relative to the stressed syllable and to the word boundaries. Quality change is measured by calculating the probability of vowel omission or replacement by another vowel phoneme. The study is based on a large corpus of read speech (over 30 hours). The results show that (1) there are two clear degrees of vowel reduction; (2) pre-stressed and post-stressed parts of the word are not symmetrical in terms of vowel reduction; (3) in pre-stressed syllables vowel quality change is correlated with quantity change.

Paper P6.29 (Presenter at poster: 09:45-11:15)

English word-medial morphonotactics: A corpus study

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The paper reports on an investigation of word-medial consonant clusters in English. Medial clusters are further subdivided into phonotactic ones, i.e. intramorphemic, and morphonotactic ones, which are morphologically complex – arising as a result of derivation or compounding. In this study we concentrate on morphonotactic clusters. We put forward the following hypothesis: since compounds may ultimately lose transparency and lexicalize, the medial clusters in compounds will tend to be relatively less marked than the medial clusters produced by derivation. In the latter, signalling a morphological boundary is a priority. In this approach, markedness is defined on the basis of the criteria of consonant description: manner and place of articulation (MoA and PoA) as well as the sonorant / obstruent distinc-

tion (S/O) between the neighbouring elements. The verification of this hypothesis has been conducted within the Beats & Binding phonotactics, which operates with the Net Auditory Distance principle (NAD).

Paper P6.30 (Presenter at poster: 09:45-11:15)
Child phonology analyzer: Processing and analyzing transcribed speech
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This paper describes two algorithms for analyzing transcribed speech corpora: (1) identification of phonological processes, and (2) phonological queries. The algorithms are implemented in Visual Basic for Applications for Microsoft Excel, thus exploiting Excel's mass-calculation capabilities to analyze large corpora quickly. The user interface features a set of editable tables that contain definitions of phonological entities. This inclusion provides great flexibility, and allows users to maintain their own working conventions.

Paper P6.31 (Presenter at poster: 09:45-11:15)
Attention, please! Expanding the GECO database
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This paper describes current and future contents of the (GERman COnversations) conversations database and promotes investigating the role of attention in phonetics research. GECO is freely available for non-commercial use. It consists of conversations of high-audio quality between female subjects, together with results of personality tests of each participant, and participants' ratings of each other and of the conversation. To our knowledge it is currently the largest German database of this type. This corpus will be doubled in size by adding more dialogs in the next two years, and these new speech data will be complemented by results of several attention tests. Some of these tests will follow established test paradigms, but we also suggest a new, less artificial paradigm for testing attention. We describe the existing GECO corpus as well as the future additions including the proposed test in this paper.

Paper P6.32 (Presenter at poster: 09:45-11:15)
A cross-database comparison of two large German speech databases
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PhttSessionz and Deutsch heute are two large German speech databases. They were created for different purposes: PhttSessionz to test Internet-based recordings and to adapt speech recognizers to the voices of adolescent speakers, Deutsch heute to document regional variation of German. The databases differ in their recording technique, the selection of recording locations and speakers, elicitation mode, and data processing. In this paper, we outline how the recordings were performed, how the data was processed and annotated, and how the two databases were imported into a single relational database system. We present acoustical measurements on the digit items of both databases. Our results confirm that the elicitation technique affects the speech produced, that f0 is quite comparable despite differ-

ent recording procedures, and that large speech technology databases with suitable metadata may well be used for the analysis of regional variation of speech.

Paper P6.33 (Presenter at poster: 09:45-11:15)
A corpus-based approach to dialectal variation in Korean vowels
Yoon, Tae-Jin; Kang, Yoonjung; Han, Sungwoo; Maeng, Hye-seon; Lee, Jiae and Kim, Kyounghue
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This paper provides an acoustic study of monophthongal vowels (i e ε ɨ a u o) in eight South Korean dialects based on a dialectal speech corpus created by the National Institute of the Korean Language (2004-2011). The spontaneous speech data were automatically segmented by force-aligning them with phonemic transcriptions. Multiple formant values using different LPC formant ceiling settings were extracted and the formant values that maximize the speaker's vowel space, as calculated by Heron's method, were selected as optimal. The resulting vowel space of the eight dialects, extracted using minimal manual correction, shows patterns that are largely consistent with the traditional impressionistic descriptions. The study lays a foundation for further acoustic exploration of spontaneous dialectal speech using computational tools. The study makes empirical and methodological contributions to the study of Korean dialects and corpus-based dialect study more generally.

Paper P6.34 (Presenter at poster: 09:45-11:15)
A multilingual study on intensity as a cue for marking prosodic boundaries
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Speech intensity is one of the main prosodic cues, playing a role in most of the suprasegmental phenomena. Despite this, its contribution to the signalling of prosodic hierarchy is still relatively understudied, compared to the other cues like duration or fundamental frequency. We present here an investigation on the role of intensity in prosodic boundary detection in four different languages, by testing several intensity measures. The statistical analysis performed showed significant correlates of prosodic boundaries, for most intensity measures employed and in all languages. Our findings were further validated with a classification experiment in which the boundary/non-boundary distinction was learned in unsupervised manner, using only intensity cues. It showed that intensity range measures outperform absolute intensity measures, with the total intensity range being consistently the best feature.

Paper P6.35 (Presenter at poster: 09:45-11:15)
Frequency of occurrence of phonemes and syllables in Thai: Analysis of spoken and written corpora
Tantibundhit, Charturong; Onsuwan, Chutamanee; Munthuli, Adirek; Kosawat, Krit and Wutiwiwatchai, Chai
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This work provides detailed frequency and distribution of Thai phonemes, biphones, and syllable types drawn from three large-scale Thai corpora (InterBEST, LOTUS-BN, and LOTUS-Cell 2.0). Comparisons are carried out to examine the extent to which linguistic variation, associated with dif-

ferent corpus types (written vs. spoken), affects frequency statistics and distribution patterns. Results and statistical analysis show that there is a high correlation in terms of occurrence frequency and distribution in the case of tones and syllable types. However, large degrees of discrepancy exist among the data sets of initial consonants, vowels, and final consonants. Comparisons of this type are needed for other languages to reliably show the degrees to which different types of language corpus and linguistic variation contribute to variability in phoneme frequency and distribution.

Speech Prosody III: Conversation, Style, Indexicality

Friday, August 14, 2015, 09:45-11:15

Paper P6.36 (Presenter at poster: 09:45-11:15)

Prosodic marking and predictability in lexical self-repair

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This paper reports on an investigation of lexical self-repair in Dutch spontaneous dialogue. Lexical self-repairs, in which one word is rejected for another, can be produced with or without notable 'prosodic marking' of the second word. It remains unclear what motivates speakers' choices, but previous research has shown that the semantic distance between the two words is relevant. This study assesses the relevance of the words' predictability. Prosodic marking judgements are modelled using an established semantic classification and a range of probabilistic variables, including both frequency-based and cloze-based measures. Results suggest that probabilistic measures add little predictive power to the semantic classification, although informative data trends can be observed.

Paper P6.37 (Presenter at poster: 09:45-11:15)

Temporal parameters discriminate better between read and narrated speech in Brazilian Portuguese

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This work shows that 5 out of 6 acoustic parameters that correctly classify read and narrated speech in Brazilian Portuguese are temporal parameters. Several statistical models showed that significant differences between the styles are revealed by: speech rate, a measure of articulation rate, duration-related salience rate, mean and standard-deviation of degree of duration-related salience and the mean of F0 first derivative. A set of 161 excerpts of narrated and read speech from ten speakers was used for training an LDA model. Another set of 57 excerpts with different subjects was used for testing the same model. Its performance with the six aforementioned parameters has achieved in the case of read speech an accuracy rate of 90 % for the training subset and 94 % for the test subset and in the case of narrated speech 70 % for the training subset and 27 % for the test subset.

Paper P6.38 (Presenter at poster: 09:45-11:15)

Hazard regression for modeling conversational silence

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It is often assumed that the participants of a conversation try to avoid simultaneous starts or lengthy silences. For this reason, they may tend to synchronize rhythmically with each other's speech. A model of conversational turn-taking based on the idea of coupled oscillators has been suggested by Wilson & Wilson [1]. However, the model has received only weak empirical support from previous studies where distributions of silence durations have been modeled directly. In the present study, we attempt to detect signs of oscillatory behavior during silence utilizing nonparametric hazard regression. In order to understand the shape of the estimated hazard rates, we postulate a latent stochastic process [2] with end of silence occurring when the process crosses a threshold. This finer-grained approach using Bayesian estimation yields a more detailed picture of synchronization between speakers and a more powerful test of oscillatory behavior.

Paper P6.39 (Presenter at poster: 09:45-11:15)

Retained in translation: Rhythm and pitch structure of A. Pushkin's 'Eugene Onegin' translated by James Falen

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This paper explores the narration of Pushkin's novel (in translation into English by James E. Falen) by Stephen Fry and Rafael Corkhill. The aim was to analyse the actors' oral performance in terms of prosodic invariants as compared to the Russian original recited by two professional actors. An attempt was made to measure the 'authenticity' of the translation by application of cluster analysis. The audio files were analysed with the help of Praat program, and the measurements were processed within a Statistica package. They included crosscorrelation of durational and F0 patterns of verses within and between speakers with cluster analysis to follow, based on the correlation coefficients. The results obtained suggest a significant correlation between the declamation of English stanzas by the British actors and corresponding Russian verses spoken by native speakers.

Paper P6.40 (Presenter at poster: 09:45-11:15)

A phonetics based computer aided prosody training system for L2 English learning

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The usual practice of learning L2 English prosody is a bottom up process, from initializing a word stress model followed by layering over effects from semantic and syntactic specifications, and finally paragraph association. The present study derives normalized 3-way stress models of F0 and duration from speech data with the above specifications of both L1 and L2 English to see where the differences are and how deviations from the norm that may inhibit intelligibility could be improved. The results are a word stress model achieved by teasing apart the contributions from sentential/paragraph effects. The normalized results reveal more distinct L1-L2 differences both in word phonology (categorical contrasts) and in larger speech units (sentence and paragraph); and how a model with these results could help L2 learning of English prosody.

Paper P6.41 (Presenter at poster: 09:45-11:15)
Sentence boundaries in text and pauses in speech: Correlation or confrontation?
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The paper explores the interaction between sentence boundaries marked by annotators in transcriptions of Russian spontaneous speech and actual prosodic boundaries in the signal. The aim of the research is to investigate whether annotators' prosodic competence allows them to correctly detect sentence boundaries in speech based on textual information only. We found that inter-annotator agreement for each sentence boundary identified in transcription was affected by both presence or absence of pause and pause duration. Mixed linear model showed that the presence or absence of pause explained 13% of variance in boundary detection. Pause duration explained only 4% of variance in inter-annotator agreement with moderate correlation of $r = 0.21$. We argue that the relatively small size of effect in this case may be due to the interaction of different pausing strategies typical for reading and spontaneous speech, ambiguity of sentence boundaries and individual differences in speech perception.

Paper P6.42 (Presenter at poster: 09:45-11:15)
Polish infant directed vs. adult directed speech: Selected acoustic-phonetic differences
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Infant-directed speech (IDS) is reported to differ significantly from adult-directed speech (ADS) in its acoustic-phonetic properties. In IDS, phonetic features of individual speech sounds tend to be intensified [6, 14, 20]. An example phenomenon documented for IDS in several languages is vowel hyperarticulation [25]. Thus, the formant frequency values (F1, F2) vary in the two target speaking styles. Other modifications can be observed in F0 levels (e.g. [5, 11]. Due to infants' preference towards IDS [5], laboratory-elicited IDS recordings are often used as stimuli in infant speech perception studies, aiming for example at the investigation of the effects of short-term exposure to foreign-language stimuli in early infancy and its potential contribution to the development of language learning skills (e.g. [15]). In the present study, we compare F0, F1, F2 values, and segmental duration in vowels produced by five female speakers of Polish, reading pseudo-word lists in IDS and ADS.

Paper P6.43 (Presenter at poster: 09:45-11:15)
Rhythm as a cue to identifiability in Maltese English
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Evidence is emerging to suggest that rhythm is possibly one of the more salient cues in the identification of Maltese English, a variety of English, distinct from other varieties, which is used extensively by many Maltese speakers of English. An attempt is made at using the Pairwise Variability Index (PVI) to: (i) categorize the clearly 'different' rhythm of this variety of English; and (ii) begin to explore whether it can be used to capture intra-variety differences – one of the hallmarks of Maltese English – across speakers. This preliminary empirical study of rhythm in this variety also gives

scope for a discussion of some of the challenges for, as well as the potential of, using the PVI measure to capture information about both 'local' and 'global' variability. Furthermore, possibilities for establishing a correlation between the PVI and 'identifiability' are explored.

Paper P6.44 (Presenter at poster: 09:45-11:15)
The effect of explicit training on the prosodic production of L2 sarcasm by Dutch learners of English
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Previous research [9] suggests that Dutch learners of (British) English are not able to express sarcasm prosodically in their L2. The present study investigates whether explicit training on the prosodic markers of sarcasm in English can improve learners' realisation of sarcasm. Sarcastic speech was elicited in short simulated telephone conversations between Dutch advanced learners of English and a native British English-speaking 'friend' in two sessions, fourteen days apart. Between the two sessions, participants were trained by means of (1) a presentation, (2) directed independent practice, and (3) evaluation of participants' production and individual feedback in small groups. L1 British English-speaking raters subsequently evaluated the degree of sarcastic sounding in the participants' responses on a five-point scale. It was found that significantly higher sarcasm ratings were given to L2 learners' production obtained after the training than that obtained before the training; explicit training on prosody has a positive effect on learners' production of sarcasm.

Paper P6.45 (Presenter at poster: 09:45-11:15)
What do we expect spontaneous speech to sound like?
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Listeners have been shown to distinguish text read aloud from spontaneous speech, with a range of prosodic features suggested as cues to speech style. However, significant variation is seen across studies, both in speech elicitation methods and in the nature of listeners' orientation to prosodic cues. We asked whether listeners could distinguish spontaneous 'map task' speech from lexically identical read utterances. Experiment 1 found that, although our spontaneous speech differed prosodically from read speech, listeners did not appear to use available cues to distinguish styles. Experiment 2 found that, even when matched spontaneous and read utterances were presented consecutively, listeners still did not reliably discriminate between styles despite available cues. We suggest that the listeners' ability to distinguish between speech styles derives from the interaction of expected and available cues, including prosody, mediated by listeners' interpretation of such cues as being representative of speech context and the intentions of the speaker.

Laboratory Phonology II

Friday, August 14, 2015, 09:45-11:15

Paper P6.46 (Presenter at poster: 09:45-11:15)

Effects of syllable structure on intonation identification in Neapolitan Italian

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In Neapolitan Italian, nuclear rises are later in yes/no questions (L^*+H) than in narrow focus statements ($L+H^*$). Also, the H target is later in closed syllable items than in open syllable ones. In three identification tasks, we found that, when stimuli are ambiguous between questions and statements, listeners exploit the information on the precise alignment within the syllable to identify the sentence type. This effect depends on durational constraints, i.e. the perceptual location of the H target is calculated relative to the actual duration of the vowel. Our results suggest that phonetic variability plays a role in shaping intonational categories and support models in which segmental and prosodic information are processed in a parallel fashion.

Paper P6.47 (Presenter at poster: 09:45-11:15)
F1/F2 targets for Finnish single vs. double vowels

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This paper explores the reason why Finnish single (short) vowels tend to occupy less peripheral positions in the F1/F2 vowel space compared to their double (long) counterparts. The results of two production studies suggest that the less extreme vowel quality of single vowels is best described as arising from undershoot of articulatory/acoustic targets due to their short durations, assuming single, context-free targets for phonemes.

Paper P6.48 (Presenter at poster: 09:45-11:15)
On the phrasing properties of Hindi relative clauses

*Gryllia, Stella; Féry, Caroline; Kügler, Frank and Pandey, Pramod
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This paper presents results from a production experiment in Hindi, showing that differences in attachment site of object relative clauses result in prosodic differences when the antecedent of the relative clause (RC) is part of a complex NP with the structure N1 of N2. In particular, based on duration and F0 data we argue that the phrasing in a matrix sentence encodes the attachment site of the object RC. When the RC attaches high, i.e. modifying the head N1 of the complex NP, N2 and N1 form together a phonological phrase, while the verb of the matrix clause forms a phonological phrase on its own. In the case of low attachment, i.e. the RC modifies the genitive N2, the N2 forms its own phonological phrase, while N1 forms a phonological phrase with the verb of the matrix clause.

Paper P6.49 (Presenter at poster: 09:45-11:15)
Acoustic and articulatory correlates of Japanese devoiced vowels

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In Japanese, high vowels may devoice between two unvoiced obstruents ($k[\kappa]kaku$ 'division', $k[i]kaku$ 'plan'). Recent studies have shown that the devoicing of non-high vowels ($k[a]karu$ 'take', $k[e]ta$ 'digit', $k[ø]tae$ 'answer') may also occur. This paper evaluates the role of vowel duration and

vocal fold gestures involved in vowel devoicing in Japanese. An experiment using an electroglottograph (EGG) was conducted, and the results showed different duration values and different vocal fold gestural patterns, depending on vowel quality. However, different duration values were not observed for partially devoiced vowels. Therefore, it is argued that Japanese vowel devoicing is a gradual phenomenon involving the reduction of time and glottal gesture magnitude. Additionally, it is suggested that Japanese devoiced vowels emerge as a targetless vowel that cannot be characterized in terms of duration and vocal fold gestures.

Paper P6.50 (Presenter at poster: 09:45-11:15)

Aerodynamic, articulatory and acoustic realization of French /ʁ/

*Gendrot, Cédric; Kühnert, Barbara and Demolin, Didier
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The study of realization of French uvular /ʁ/ is usually considered as problematic due to its variability. In this study, an articulatory (EMA) and aerodynamic experiment allowed us to determine its major axes of variation. We show that the degree of constriction between the tongue and the palate is related to the voicing of the consonant and we validate the use of a harmonic-to-noise ratio for the measurement of variation of /ʁ/. Aerodynamic data also show that the variation of Nasal Airflow is not significant but a ratio between Oral Airflow and Intra-Oral Pressure significantly varies according to the different realizations of /ʁ/. Subglottic pressure only plays a significant role in specific cases. Finally, acoustic analyses of continuous speech based on results found in this study investigate prosodic factors of variation for the production of /ʁ/.

Paper P6.51 (Presenter at poster: 09:45-11:15)

The influence of syllable number and task-related attention on the perception of rhythmic irregularities: An ERP study on German compounds

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The present paper explores the processing of rhythmic irregularities in the form of so-called stress clashes in German noun compounds. This type of rhythmic irregularity has been found to be problematic as it induces higher costs in language processing. Moreover, the number of syllables in rhythmically irregular structures seems to play an important role for their correct perception. The present study thus concentrates on the influence of syllable number and task-relatedness and presents data from two ERP experiments. Their results show that stress clashes are only detectable if attention is clearly directed towards the prosodic structure, or if the words contain an even number of syllables and thus a preferred binary structure of prosodic feet.

Paper P6.52 (Presenter at poster: 09:45-11:15)

Phonemic quantity contrasts in normal and non-pathological perturbed speech

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This paper investigates the behaviour of vowel quantity contrasts when speaking rate is increased and durations tend to be compressed. Two speakers, with no speech or hearing

impairment, produced oral vowels belonging to two phonological classes: short and long. Production was done at a self-selected conversational speaking rate and at a fast speaking rate. The overwhelming evidence from our acoustic data is that vowel duration is the determining factor in distinguishing the two categories. Acoustic results further show that short and long vowels are distinguished not only by vowel duration but also by post-vocalic consonant duration: phonologically short vowels are followed by phonetically long consonants in both normal and perturbed speech conditions. Increase in speech rate leads to a compression of absolute durations of short and long vowels as well as short and long post-vocalic consonants. Irrespective of the expansion or compression of the acoustic signal, phonemic contrasts emerge consistently in the VC domain.

Paper P6.53 (Presenter at poster: 09:45-11:15)
Music perception influences plosive perception in Wu dialects

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Wu is a dialect group of the Chinese branch of Sino-Tibetan languages. Wu dialects are known for having plain, aspirated as well as voiced stops. Crucially, voiced plosives always co-occur with low-register tones. We investigated the perception of voicing distinction among phonetically and phonologically trained Wu native speakers by superimposing different tones on syllables starting with originally plain, aspirated, and voiced stops. The results show that recognition of the voicing contrast turned out to be largely inaccurate, and the subjects mostly relied on lexical tone rather than on phonation itself. Subsequently, we examined the perception of music which improved the recognition of the phonation distinction. Although the perception of the voicing distinction did not become more accurate, it turned out that listening to a musical fragment inbetween the language fragments led to a different classification of the lexical tones. This, in turn, led to a different perception of the plosives.

Paper P6.54 (Presenter at poster: 09:45-11:15)
It is easier to learn the meaning of forms with a canonical stress pattern

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Generative linguistics is predicated on a conceptual distinction between the lexicon and the grammar. However in practice, lexical and grammatical acquisition are interdependent: phonotactics are projected in part from the lexicon [17], while the underlying form of a morpheme depends on the pattern of contrast and neutralization determined by the grammar [25]. This paper demonstrates a causative effect of phonotactic knowledge on word-learning. Stress position is contrastive in English, but trochees are statistically predominant in the lexicon. This study asks whether it is easier to learn novel trochaic words than iambic ones. It was found that novel trochaic and iambic forms are remembered equally well, but the form-meaning association was better learned for trochees.

Paper P6.55 (Presenter at poster: 09:45-11:15)

Melodic alternations in Spanish

Torreira, Francisco

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This article describes how the tonal elements of two common Spanish intonation contours – the falling statement and the low-rising-falling request – align with the segmental string in broad-focus utterances differing in the number of prosodic words. Using an imitation-and-completion task, we show that (i) the last stressed syllable of the utterance, traditionally viewed as carrying the ‘nuclear’ accent, associates with either a high or a low tonal element depending on phrase length (ii) that certain tonal elements can be realized or omitted depending on the availability of specific metrical positions in their intonational phrase, and (iii) that the high tonal element of the request contour associates with either a stressed syllable or an intonational phrase edge depending on phrase length. On the basis of these facts, and in contrast to previous descriptions of Spanish intonation relying on obligatory and constant nuclear contours (e.g. L* L% for all neutral statements), we argue for a less constrained intonational morphology involving tonal units linked to the segmental string via contour-specific principles.

Paper P6.56 (Presenter at poster: 09:45-11:15)
Prosodic boundary strength and the location of pre-nuclear phrasal prominence

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The assignment of pre-nuclear phrasal prominence in sequences like THIRteen MEN (vs. thirTEEN) is not fully understood. We propose that the location of pre-nuclear prominence in thirteen is sensitive to the strength of the prosodic boundary separating the clashing words thirteen and men: a weaker prosodic boundary should invite early prominence on THIRteen. Eleven speakers read 14 potentially clashing word pairs in syntactic contexts likely to elicit a stronger boundary (NP+ VP: How does the canteen cook these days?) or a weaker boundary (Pre-modifier+NOUN: Who is the canteen cook these days?). Syntactic condition had significant effects in the predicted direction on the strength of the critical prosodic boundary. Results suggest that boundary strength modifies the relative prominence of the two syllables in the first word (e.g. canteen), but analyses of F0 and duration suggest that the effect is primarily, or perhaps even exclusively, localised on the 2nd syllable, e.g. -teen.

POSTER SESSION 7

Phonology-Phonetics Interface

Friday, August 14, 2015, 15:00-16:30

Paper P7.1 (Presenter at poster: 15:00-16:30)

Topics in Tone 3 Sandhi

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Although Chen's [1] Minimal Rhythmic Units analysis and Duanmu's [2] Metrical Feet analysis can effectively account for a wide range of Tone 3 Sandhi (T3S) phenomena in Mandarin Chinese, the T3S patterns of sentences with a Topic phrase (TP sentences) were not discussed in their works. Therefore, this study intends to critically examine the power of prediction of those analyses by analyzing the T3S patterns produced by native speakers of Mandarin Chinese. The experimental results from a recitation task with TP sentences did not support Duanmu's analysis, which predicts that the critical words can be either a third tone or a second tone. On the other hand, Chen's analysis successfully predicts that the critical words in those sentences retain their citation tone (i.e. Tone 3). Based on the experimental results, the theoretical implications of these two analyses are discussed.

Paper P7.2 (Presenter at poster: 15:00-16:30)

High vowels devoicing and elision in Japanese: A diachronic approach

Pinto, Francesca

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The present study will focus on occurrence of fully voiced, devoiced and elided high vowels in Japanese. High vowels elision in Japanese is supported by clear acoustic evidences, even though it is not globally accepted by scholars in the field. Elided vowels, hence, are considered here to have their own status. Moreover, this study is conceived in order to state differences and analogies among four dialects and between five age groups. In fact, the main interest of this research is to prove that high vowel elision may be considered as an innovative phenomenon. Consequently, it is expected that a diatopically and diachronically based study may suggest the drift of Japanese language about the said phenomenon. Therefore, it may be possible to hypothesize changes on the strict syllable structure deriving from the Japanese writing system, mainly composed of syllabic morae, which conditions mother tongue perception of Japanese phonology and phonotactics.

Paper P7.3 (Presenter at poster: 15:00-16:30)

On the phonetic variation of intervocalic geminates in Libyan Arabic

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This paper reports on the phonetic and phonological patterns of gemination in Libyan Arabic (LA). It also reports on the temporal relationship between geminate consonants and vowel length. While previous studies on Arabic gemination have either focused on True geminates or reported results on data that consists more than one type of geminates, without investigating its effect on the phonetic output, the present study investigates the effect of the phonological status of a geminate on the phonetic realization. The results show that intervocalic geminates in LA are significantly longer than their singleton counterparts. The duration of the preceding vowels gives evidence in support of temporal compensation as one of the correlates of geminates. No significant durational differences could be found between three different intervocalic geminate types. However, the behavior of the preceding short and long vowels is suggestive and

may contribute to the phonetic distinction between them.

Paper P7.4 (Presenter at poster: 15:00-16:30)

Rhythmic structure of English and Japanese: A constraint based analysis of nursery rhymes and Haiku

Ishikawa, Yukiko and Miyakoda, Haruko

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Studies on English verses have claimed that the position in which a pause is inserted has a great effect on determining their rhythm. The position in which a pause appears follows a certain rule for the verses to be 'rhythmic'. However, it is not yet obvious whether Japanese Haiku also has such tendencies or preferences. In this paper, we analysed and compared the metrical structure of English verses with that of Haiku within the Optimality Theory framework. We claim that the constraints employed to account for English verses can also account for the preference of the patterning of Haiku.

Paper P7.5 (Presenter at poster: 15:00-16:30)

The role of labiolingual gestural coordination in spatiotemporal facilitation of speech production in Turkish, Turkmen and Hindi

Gupta, Ganesh and Dutta, Indranil

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Sound patterns of vowel harmony reduce articulatory effort which facilitates speech production with increased speech rate and accuracy. We argue that back harmony patterns reduce articulatory effort compared to height harmony and non-harmony patterns and harmony patterns formed from front unrounded (FU) vowels reduce articulatory effort compared to those of front rounded (FR) vowels. We report on a series of priming experiments on Turkish, Turkmen and Hindi. The stimuli consist of items that are primed for back harmony (BH), disharmony (DH) and height harmony (HH) sequences under two conditions; front rounded vowel (FR) and front unrounded vowel (FU). The vowels /i/, /e/, /y/, /ø/, /u/, /o/ and consonants /p/, /t/, /k/ form segments used in the stimuli. Results of the LME test report that harmony patterns of FU condition increase speech rate and accuracy compared to the harmony patterns of FR condition; BH patterns increase speech rate compared to HH and DH patterns of FU condition.

Paper P7.6 (Presenter at poster: 15:00-16:30)

Prosody in Italian particle verbs: A preliminary study

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In this study we investigate the prosody of Italian Particle Verbs (henceforth, PrtV's). After comparing two alternative hypotheses about the prosodic constituent PrtV's correspond to, we concentrate on three rules of Italian phonology that differ in their domain of application: the phonological word (ω) vs. the phonological phrase (φ). We then report on a production experiment carried out with 2 speakers of Central-Southern Italian and 3 speakers of Northern Italian. By concentrating on the phonetic correlate of duration, we provide experimental evidence that V and Prt cannot be mapped onto a single ω but can be mapped onto a single φ .

Paper P7.7 (Presenter at poster: 15:00-16:30)

Boundary disputes and sociophonetic variation: Schwa-

epenthesis in Dutch rC clusters

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Dutch schwa-epenthesis in liquid+consonant clusters has been the subject of a "boundary dispute", as to its phonetic or phonological status. There has been surprisingly little instrumental work on the phenomenon that could function as an arbiter in this dispute. This paper attempts to remedy this situation by bringing results from a corpus of sociophonetic variation data to bear on the issue, focussing on the duration of the epenthesised schwa and variability of /r/ in rC clusters. The results show that both phonetic and phonological factors may be at play, and that there are intricate patterns of dialectal variation, highlighting the relevance of sociophonetic data on phonetics-phonology interface issues.

Paper P7.8 (Presenter at poster: 15:00-16:30)

The role of contrast maintenance in the temporal structure of the rhyme.

*Cox, Felicity; Palethorpe, Sallyanne and Miles, Kelly
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We explore the relationship between temporal elements of the VC rhyme as a function of inherent vowel length and coda voicing in Australian English. Our findings for single monosyllabic words suggest that temporal organisation of the rhyme may be modulated by the strength of the durational contrast associated with long/short vowel pairs. Vowels such as /e:/ vs /e/ which contrast by duration alone in Australian English are compared to vowels /i:/ vs /i/ for which duration is just one of the important contrastive cues. In contexts where coda voicing has the potential to disrupt length contrast, such as when the long vowel /e:/ occurs in a rhyme with a voiceless coda, we found that vowel length was maximised at the expense of coda closure duration. We propose that the requirement of contrast maintenance may place constraints on competing temporal influences and affect the organisation of elements within the syllable rhyme.

Tone II: Speech and Music

Friday, August 14, 2015, 15:00-16:30

Paper P7.9 (Presenter at poster: 15:00-16:30)

Do note values affect parallelism between lexical tones and musical notes in Thai pop songs?

*Ketkaew, Chawadon and Pittayaporn, Pittayawat
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This paper aims to investigate parallelism between tonal transitions and musical note transitions in Thai pop songs, focusing on the effect of note duration on parallelism. In agreement with previous studies, there is a statistically significant parallelism between tonal transitions and musical note transitions, though note duration has no significant effect on the degree of parallelism.

Paper P7.10 (Presenter at poster: 15:00-16:30)

The relationships between speech tone and melody in the khap singing of Tai Dam in Laos

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The khap Tai Dam is the singing of the Tai Dam (or Black Tai) ethnic group. This paper presents the results of an ongoing research studying the relationship between spoken and sung tones in this specific repertoire. Two questions are addressed: (1) Are speech tones realised in khap Tai Dam singing? (2) Are the contours of speech and song similar or different in khap Tai Dam? The main results so far show that even without a strict parallel between spoken and sung tones, there is a correspondence between speech and singing in khap Tai Dam.

Speech Technology

Friday, August 14, 2015, 15:00-16:30

Paper P7.11 (Presenter at poster: 15:00-16:30)

Complete IPA Keyboard for iOS devices.

*Dobrowolski, Piotr
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The paper introduces a personally designed keyboard application for the iOS system. Its main premise is to combine the functionality of a regular iOS keyboard with the complete IPA alphabet, which is a novelty on this particular mobile platform. A brief list of the Keyboard's functionalities is introduced, alongside several further comments on the subject, general possibilities for the users, and the author's plans for further development of the project.

Paper P7.12 (Presenter at poster: 15:00-16:30)

A measure of phonetic similarity to quantify pronunciation variation by using ASR technology

*Shi, Tianze; Kasahara, Shun; Pongkittiphan, Teeraphon; Minematsu, Nobuaki; Saito, Daisuke and Hirose, Keiichi
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It attracts a researcher's interest how to define a quantitative measure of phonetic similarity between IPA transcripts of the same sentence read by two speakers. This problem can be divided into how to align two transcripts and how to quantify alignment gap. In this paper, we introduce a method of similarity calculation using phone-based or phoneme-based acoustic models trained with the algorithm used to develop Automatic Speech Recognition (ASR) systems. Use of acoustic models will introduce an issue of speaker dependency because speech spectrums always convey the information of the training speaker's age and gender, which is totally irrelevant to phonetic similarity calculation. We examine how independent our method is of training speakers and how close the calculated similarity is to the similarity subjectively rated through a listening test. We also compare our method to recent work and show how our method can give higher correlation by 4 points to human-rated similarity.

Paper P7.13 (Presenter at poster: 15:00-16:30)

Automatic recognition of geographically-proximate accents using content-controlled and content-mismatched speech data

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This contribution advances us towards developing an automatic accent recognition system with greater practical potential. Y-ACCDIST is a text-dependent accent recognition system intended for forensic applications. Given a speech sample, it aims to identify the speaker's geographical origin, which may be useful in forensic contexts. While promising accent recognition rates are reported (86.7% on a four-way classification task), these have been obtained by comparing speakers producing the same reading passage. The focus here is to observe system performance on content-mismatched (spontaneous) speech data and to speculate about ways to improve the system when it is faced with more challenging data. The ability to process content-mismatched data separates Y-ACCDIST from similar past systems.

Paper P7.14 (Presenter at poster: 15:00-16:30)
Tongue contour extraction from ultrasound images based on deep neural network
Jauvard-Hakoun, Aurore; Xu, Kele; Roussel-Ragot, Pierre; Dreyfus, Gérard; Stone, Maureen and Denby, Bruce
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Studying tongue motion during speech using ultrasound is a standard procedure; however automatic ultrasound image labelling remains a challenge, as standard tongue shape extraction methods typically require human intervention. This article presents a method based on deep neural networks to automatically extract tongue contours from speech ultrasound images. We use a deep autoencoder trained to learn the relationship between an image and its related contour, so that the model is able to automatically reconstruct contours from the ultrasound image alone. We use an automatic labelling algorithm instead of time-consuming hand-labelling during the training process. We afterwards estimate the performances of both automatic labelling and contour extraction as compared to hand-labelling. Observed results show quality scores comparable to the state of the art.

Paper P7.15 (Presenter at poster: 15:00-16:30)
Prosodic classification of discourse markers
Cabarrão, Vera; Moniz, Helena; Ferreira, Jaime; Batista, Fernando; Trancoso, Isabel; Mata, Ana Isabel and Curto, Sérgio
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The first contribution of this study is the description of the prosodic behavior of discourse markers present in two speech corpora of European Portuguese (EP) in different domains (university lectures and map-task dialogues). The second contribution is a multiclass classification to verify, given their prosodic features, which words in both corpora are classified as discourse markers, which are disfluencies, and which correspond to words that are neither markers nor disfluencies (chunks). Our goal is to automatically predict discourse markers and include them in rich transcripts, along with other structural metadata events (e.g. disfluencies and punctuation marks) that are already encompassed in the language models of our in-house speech recognizer. Results show that the automatic classification of discourse markers is better for the lectures' corpus (87%) than for the dialogue corpus (84%). Nonetheless, in both corpora, discourse markers are more easily confused with chunks than with disfluencies.

Paper P7.16 (Presenter at poster: 15:00-16:30)

Automatic recognition of prosodic patterns in semantic verbal fluency tests: An animal naming task for edutainment applications

Moniz, Helena; Pompili, Anna; Batista, Fernando; Trancoso, Isabel; Abad, Alberto and Amorim, Cristiana
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This paper automatically detects prosodic patterns in the domain of semantic fluency tests. Verbal fluency tests aim at evaluating the spontaneous production of words under constrained conditions. Mostly used for assessing cognitive impairment, they can be used in a plethora of domains, as edutainment applications or games with educational purposes. This work discriminates between list effects, disfluencies, and other linguistic events in an animal naming task. Recordings from 42 Portuguese speakers were automatically recognized and AuToBI was applied in order to detect prosodic patterns, using both European Portuguese and English models. Both models allowed for differentiated list effects from the other events, mostly represented by the tunes: L* H/L(-%) (English models) or L*+H H/L(-%) (Portuguese models). However, English models proved to be more suitable because they rely on substantial more training material.

Paper P7.17 (Presenter at poster: 15:00-16:30)
Audience response system-based assessment for analysis-by-synthesis
Edlund, Jens; Tånnander, Christina and Gustafson, Joakim
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We propose a variety of Hollywood's film screenings as a productive tool for phonetic and prosodic research through analysis-by-synthesis. An initial study where the method is used to allow a potential target audience, rather than trained experts, to point out oddities in an extended stretch of connected synthesised speech is presented as proof-of-concept.

Tone II: Perception

Friday, August 14, 2015, 15:00-16:30

Paper P7.18 (Presenter at poster: 15:00-16:30)

A model of the perception of Serbo-Croatian word tone
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Purcell (1979) presented data on the perception of Serbo-Croatian word tone by native speakers. The present paper develops a logistic regression model of the perception of Serbo-Croatian word tone using Purcell's 1979 data. Two models are developed: an overall model and a two-part, split model. Model fits are calculated and plotted. The two-part model fits the perceptual data better. Model coefficients are interpreted in terms of the odds of perceptual judgments at varying points of time.

Paper P7.19 (Presenter at poster: 15:00-16:30)
Correlates of Chinese neutral tone perception in different contexts
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A psychoacoustic experiment was conducted to investigate correlates of neutral tone perception and the distribution of the perceptual space in three contexts, i.e. isolation, on-focus and post-focus for Standard Chinese. To this end, we adopted a minimal word pair, i.e. /ʂʐ2θəəu2/(head of snake) and /ʂʂ2θəəu0/ (tongue) where tonal contrast is between neutral tone T0 and a rising tone T2 (normal stressed tone). The result shows that pitch is always a more reliable cue than duration in neutral tone perception. However, the contribution of different acoustic cues and the distribution of the perceptual spaces are not only related to contexts, but also to the differences between the tonal spaces of contrastive tones. The way acoustic cues influence the perception of unstressed items in Chinese is not always consistent with that in stress languages such as English and Dutch.

Paper P7.20 (Presenter at poster: 15:00-16:30)
A fundamental bias for residue pitch perception in tone language speakers

*Petitti, Elizabeth and Perrachione, Tyler
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A complex tone composed of only higher-order harmonics elicits a pitch percept equivalent to the tone's missing fundamental frequency (f_0). When judging the direction of residue pitch change between two such tones, however, listeners may have completely opposite perceptual experiences depending on whether they are biased to perceive changes based on the overall spectrum or the missing f_0 (harmonic spacing). Individual differences in residue pitch change judgments are reliable and have been associated with differences in functional neuroanatomy and musical experience. Tone languages put greater pitch processing demands on their speakers than non-tone languages, and we investigated whether these lifelong differences in linguistic pitch processing affect listeners' bias for residue pitch. We found that tone language speakers are significantly more likely to perceive pitch changes based on the missing f_0 than English speakers. These results suggest that tone-language speakers' privileged experience with linguistic pitch fundamentally tunes their basic auditory processing.

Paper P7.21 (Presenter at poster: 15:00-16:30)
Perception of pitch contours by native and non-native tone listeners

*Wayland, Ratree; Zhu, Yiqing and Kaan, Edith
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Level, rising and falling pitch contours were presented to twenty native speakers of Mandarin Chinese and twenty-one native speakers of English for discrimination in a same-different categorial discrimination task. Overall, Mandarin listeners were significantly more successful than English listeners. However, both groups exhibited a similar pattern of perceptual advantage for rising and falling contours. They were also more successful at discriminating the level contour from the rising contour than from the falling contour. Experience with the native tone systems may partially explain the results. However, a rising contour may be inherently more perceptually salient than either a falling or a level contour.

Paper P7.22 (Presenter at poster: 15:00-16:30)

Mandarin listeners can learn non-native lexical tones through distributional learning

*Ong, Jia Hoong; Burnham, Denis and Escudero, Paola
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In a previous study we found that non-tone language speakers are able to form lexical tone categories through extracting frequency distribution in training, but only when attention is directed towards the distribution [12]. This study extends the distributional learning literature by investigating how tone language speakers' linguistic experience with tones affects their distributional learning of non-native lexical tones. Native Mandarin listeners were presented with a Thai lexical tone minimal pair distributed either unimodally (promoting formation of a single category), or bimodally (promoting two category formation). Assessment of performance in a discrimination task before and after exposure showed that the Bimodal Distribution group improved significantly from Pretest to Posttest whereas the Unimodal group did not. These results suggest that tone language speakers capitalise on their experience in using pitch phonemically to form the appropriate number of lexical tone categories based on the distribution that they hear.

Paper P7.23 (Presenter at poster: 15:00-16:30)

Effect of contextual tonal variation on speech recognition: Evidence from eye movements

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While much is known about how lexical tones are perceived in isolation, little has been done on the perception of tones in connected speech. This study, via visual world paradigm, investigates the effect of contextual tonal variation on speech recognition in Tianjin Mandarin, where three types of contextual tonal variation have been identified: Near-Merger Sandhi, No-Merger Sandhi, and No-Sandhi Coarticulation. Listeners were asked to identify the target amongst an array of four possibilities upon hearing a disyllabic collocation, while their eye movements were tracked. Results suggest that native listeners are sensitive to fine-grained phonetic details in contextual variation of lexical tones. No-Sandhi Coarticulation was the easiest to recognize as participants fixated on the targets the earliest among three conditions. Near-Merger Sandhi was more difficult to process than No-Merger Sandhi, reflected in the overall less proportion of looks to target.

Paper P7.24 (Presenter at poster: 15:00-16:30)

Auditory-visual augmentation of Thai lexical tone perception in the elderly

*Kasisopa, Benjawan; Luksaneeyanawin, Sudaporn; Techacharoenrungrueang, Suparak and Burnham, Denis
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This study investigated the effects of aging, auditory and auditory-visual perception of lexical tone of native Thai listeners. Elderly and younger Adults' discrimination of the 5 Thai tones was investigated in audio-visual (AV), audio-only (AO), and visual-only (VO) conditions at two inter-stimulus intervals (ISIs) [500 and 1500 ms] in clear and noisy conditions. Generally, the Elderly performed more poorly than the Adults, but in both groups there was similar ranking of the

relative discriminability of tone contrasts. Notably, in noise there was better tone discrimination in AV than in AO, and this was equally the case for young Adults and the Elderly. This shows that the elderly can and do use visual speech information to augment auditory perception of tone. The Elderly also benefitted more from the 1500 ms ISI suggesting that their tone perception is better when a more phonological (rather than acoustic) mode of processing is available.

Paper P7.25 (Presenter at poster: 15:00-16:30)

Perception of Cantonese tones by Mandarin speakers

Wu, Mengyue; Bundgaard-Nielsen, Rikke; Baker, Brett; Best, Catherine and Fletcher, Janet

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The current study investigates how non-native tones are perceived by speakers whose own native language has fewer tones. The analysis is presented within a Perceptual Assimilation Model—Supra-segmental (PAM-S) framework [16]. The results are consistent with PAM-S predictions and indicate both phonetic and phonological assimilation of Cantonese tones by Mandarin speakers.

Forensic Phonetics and Speaker Characteristics

Friday, August 14, 2015, 15:00-16:30

Paper P7.26 (Presenter at poster: 15:00-16:30)

Speaker discrimination using formant trajectories from casework recordings: Can LDA do it?

Skarnitzl, Radek and Vařková, Jitka

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Formant trajectories have been shown to convey a great deal of speaker-specific information and their speaker-discriminatory potential has been quantified using Linear Discriminant Analysis on laboratory material [16]. This study tests the applicability of LDA on three sets of real-case forensic recordings. Given the limitations of LDA, we used the actual formant trajectory values (F1-F3) and coefficients of the quadratic and cubic fit. As for classification rate, our results indicate that LDA performs comparably to the studio condition, with quadratic fit being the most convenient way of parametrizing the trajectory. However, LDA performed well above chance when discriminating between recordings of the same speaker; it is especially this inability to "identify" the same speaker which makes the use of LDA in forensic practice not recommendable.

Paper P7.27 (Presenter at poster: 15:00-16:30)

Individual and group variation in disfluency features: A cross-accent investigation

McDougall, Kirsty; Duckworth, Martin and Hudson, Toby
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A study of individual differences in the fluency disruptions of speakers of two different accents, Standard Southern British English (SSBE) and York English is presented. Distributions of rates of occurrence per 100 syllables are examined for filled and silent pauses, repetitions, prolongations and (self-) interruptions, and subcategories of these. Patterns of occurrence of disfluency features show considerable between-

speaker variation in both SSBE and York English. Similar ranges of speakers' overall disfluency rates are exhibited by both accents, but cross-accent differences are present in the patterning of some disfluency feature categories. The results suggest that a detailed record of disfluency features is a useful additional tool in forensic speaker comparison.

Paper P7.28 (Presenter at poster: 15:00-16:30)

Comparisons of speaker recognition strengths using suprasegmental duration and intensity variability: An artificial neural networks approach

He, Lei; Glavitsch, Ulrike and Dellwo, Volker
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This study compares the speaker recognition strengths based on suprasegmental duration and intensity variability in the speech signal using artificial neural networks. Such an algorithm can well capture the nonlinear effects in the data, and is more robust against noise in the data. Three rounds of classification tasks were performed with 1) duration metrics, 2) intensity metrics, and 3) the combination of duration and intensity metrics as the independent variables. The results indicated that both intensity and combined metrics significantly outperformed the duration metrics. Moreover, the combination of intensity and duration metrics showed higher probability of improved speaker classifications than intensity metrics over duration metrics.

Paper P7.29 (Presenter at poster: 15:00-16:30)

The influence of body posture on the acoustic speech signal

Flory, Yvonne and Nolan, Francis
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Few studies address the influence of postural changes on the vocal mechanism, and where they do so, they most often neglect the acoustic implications. This study tested participants in upright, prone and supine posture and assessed the resulting changes in formant frequencies and F0. Results show that while most formants appear to be subject to compensation strategies by the speaker, F3 differs consistently between body postures. F0 as well rises in non-neutral postures. This work is of relevance to the forensic-phonetic framework, which is reliant on higher formant frequencies in particular to carry out forensic speaker comparison. Further research is needed in order to assess articulatory movement with respect to its acoustic correlates.

Paper P7.30 (Presenter at poster: 15:00-16:30)

Front-end approaches to the issue of correlations in forensic speaker comparison

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In likelihood ratio (LR)-based forensic speaker comparison it is essential to consider correlations between parameters to accurately estimate the overall strength of the evidence. Current approaches attempt to deal with correlations after the computation of LRs (back-end processing). This paper explores alternative, front-end techniques, which consider the underlying correlation structure of the raw data. Calibrated LRs were computed for a range of parameters commonly analysed in speaker comparisons. LRs were combined using (1) an assumption of independence, (2) the

mean, (3) assumptions from phonetic theory, and (4) empirical correlations in the raw data. System (1), based on an assumption of independence, produced the best validity ($\text{Clr} = 0.04$). Predictably, overall strength of evidence was also highest for system (1), while strength of evidence was weakest using the mean (2). Both systems (3) and (4) performed well achieving Clr values of ca. 0.09.

Paper P7.31 (Presenter at poster: 15:00-16:30)

Voice lineups: A practical guide

de Jong, Gea; Nolan, Francis; McDougall, Kirsty and Hudson, Toby

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In this article the authors aim to offer some practical advice for phoneticians being confronted with a voice parade request for the first time, by providing a detailed description of a parade carried out successfully in the UK. The methodology used in this parade is based on a number of studies on earwitnesses carried out since the 1990s. However, it primarily builds on the work by Nolan [5] for general advice on the construction of parades and on Rietveld and Broeders [7] for measuring the similarity of voices. In addition, useful ways are suggested to instruct and train identification officers involved. Special care is taken to ensure an efficient and smooth execution of the parade, keeping the risk of errors to a minimum. Finally, general issues important to voice parades are raised and discussed.

Speech Acoustics II: Prosody and Connected Speech

Friday, August 14, 2015, 15:00-16:30

Paper P7.32 (Presenter at poster: 15:00-16:30)

Coarticulation of tone and CV segment in citation and sentence form

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Traditional and modified locus equations (LE) were used to examine the interaction of tone on the coarticulation of C+V of a tone-bearing syllable as a function of tone (Mid and High) and speech style (citation and sentence). Traditional LE slope found no significant coarticulatory differences for Mid-tone relative to Low-tone condition, but showed higher slopes for sentence relative to citation forms. Systematic tone effects were observed by modified locus equations (MLE) parameter. 3D plots of F0, F1 & F2 also found tone and style effects.

Paper P7.33 (Presenter at poster: 15:00-16:30)

Phonetic reduction, vowel duration, and prosodic structure

Burdin, Rachel Steindel and Clopper, Cynthia G.

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Word frequency, phonological neighborhood density, semantic predictability in context, and discourse mention have all been previously found to cause reduction of vowels. Other researchers have suggested that reduction based on these factors is reflective of a unified process in which "redundant" or "predictable" elements are reduced, and that

this reduction is largely mediated by prosody. Using a large read corpus, we show that these four factors show different types of reduction effects, and that there are reduction effects of prosody independent of duration, and vice versa, suggesting the existence of multiple processes underlying reduction.

Paper P7.34 (Presenter at poster: 15:00-16:30)

Acoustic effects of loud speech and interrelationships among measures

Koenig, Laura and Fuchs, Susanne

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This paper investigates how louder speech affects measures of formants, duration, intensity, and fundamental frequency in female speakers of German. Past studies of loud speech have not systematically assessed a large number of vowels, or how formant values compare to other acoustic measures. Loudness variation was elicited naturally in reading and question-answer tasks with target words designed to sample around the vowel space. Results indicate that the high tense vowels /i/ and /u/ show little formant variation in loud speech; other vowels vary mainly in the form of higher F1 in loud speech. Correlational analyses also showed vowel effects: Overall, the data demonstrated consistent relationships between F1 and intensity, duration, and f0 but effects were weaker and sometimes insignificant for /y u i/. The results indicate that conclusions about the effects of loudness need to be made on a vowel-specific basis

Paper P7.35 (Presenter at poster: 15:00-16:30)

The effects of intonation on acoustic properties of fricatives

Żygis, Marzena; Daniel, Pape; Jesus, Luis and Jaskula, Marek

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This study investigates acoustic properties of the Polish retroflex and alveolo-palatal fricatives and affricates /ʂ/, /ʈʂ/, /ç/ and /ʈç/. The sibilants were produced in (i) yes/no questions with rising intonation and (ii) answers with falling intonation. Multitaper spectra were used to compare the two places of articulation. Results show that the Centre of Gravity (COG) did not differentiate retroflexes from alveolo-palatals in the question condition. The same consonants, however, display significantly different COG values if they are produced in the statement condition. Other spectral measurements (highest spectral peak, standard deviation, kurtosis) were also significantly different with regard to the two places of articulation and intonation types. The results indicate that special attention should be given to intonational differences when acoustic properties of sibilants are investigated.

Paper P7.36 (Presenter at poster: 15:00-16:30)

Anticipatory planning of r-insertion in Australian English

Yuen, Ivan; Cox, Felicity and Demuth, Katherine

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In non-rhotic Australian English, glottalization and 'r' insertion are strategies used to separate contiguous heterosyllabic vowels (hiatus). This study examined hiatus breaking strategies to determine whether realisation and incidence

differed as a function of prosodic context. We were also interested in whether inserted 'r' exhibited pre-planning. In an elicited production task, 14 nonrhotic Australian English speakers produced sentences containing two types of coda-less monosyllabic target noun (e.g. paw - containing no orthographic 'r', and door - containing orthographic 'r'). These were followed by an onset-less preposition (of, under, above) (e.g. 'This is the paw of the dog'). The incidence of inserted 'r' did not vary significantly across prosodically controlled but orthographically different contexts. However, the nature of the following preposition affected the choice of 'r' vs. glottalization. Importantly, for those speakers who produced auditorily identified 'r', we observed anticipatory F3 lowering in the vowel preceding inserted 'r' indicating non-local planning.

Paper P7.37 (Presenter at poster: 15:00-16:30)
An acoustic analysis of 'Kulning' (cattle calls) recorded in an outdoor setting on location in Dalarna (Sweden)

Eklund, Robert and McAllister, Anita

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The Swedish cattle call singing style 'kulning' is surprisingly understudied, despite its almost mythical status in Swedish folklore. While some physiological-productive aspects of kulning have been treated in previous work, acoustic properties are still much lacking description. This paper adds to and extends the results presented in a previous study [7], where kulning and head voice ("falsetto") was acoustically analysed in two indoor settings: a normal room and an anechoic chamber. In the present study, the same singer, singing the same kulning in the same two modes (kulning and head voice), was recorded in an outdoor setting (close to the singer's home), thus allowing for a comparison between "clinical" and more ecologically valid data.

Paper P7.38 (Presenter at poster: 15:00-16:30)
Pitch and duration in RP: A corpus-based historical exploration

Przedlacka, Joanna and Baghai Ravary, Ladan

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As a reference variety, Received Pronunciation (RP), a non-regional accent of British English, is extensively described both in terms of synchronic variation and its historical development. There is a long tradition of describing changes over time in the traditional phonemic framework. However, modern corpus-based acoustic investigations have not been attempted on material older than the 1950s and most of such work focuses on vowel systems, with other phonetic features less extensively covered. In the present paper, we examine data from two closely matched groups of middle-aged male RP speakers, recorded in 1929 and 2010, demonstrating that corpus-based comparisons can be extended further back in time than previously done. Investigating pitch and durational characteristics of their speech, we also show historical investigations can go beyond the segment. Possible reasons for the discrepancies between the groups are explored.

Paper P7.39 (Presenter at poster: 15:00-16:30)
Utilising Hidden Markov Modelling for the assessment of accommodation in conversational speech

Solanki, Vijay; Stuart-Smith, Jane; Vinciarelli, Alessandro and

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The work presented here suggests a method for assessing speech accommodation in a holistic acoustic manner by utilising Hidden Markov Models (HMMs). The rationale for implementation of this method is presented along with an explanation of how HMMs work. Here, a heavily simplified HMM is used (single state; mixture of gaussians) in order to assess the applicability of more sophisticated HMMs. Results are presented from a small-scale study of six pairs of female Scottish-English speakers, showing measurement of significant trends and changes in holistic acoustic features of speakers during conversational interaction. Our findings suggest that methods integrating HMMs with current holistic acoustic measures of speech may be a useful tool in accounting for acoustic change due to speaker interaction.

Speech Acoustics II: Models and Methods

Friday, August 14, 2015, 15:00-16:30

Paper P7.40 (Presenter at poster: 15:00-16:30)

Improved formant frequency measurements of short segments

Weenink, David

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This study aims to investigate the role of intonation in the perception of emotion in spoken Brazilian Portuguese (BP). Recordings of 32 BP speakers were downloaded from the internet and presented to 36 listeners divided equally into two nationality groups (Brazilian vs. English). The participants performed two perception experiments, one based on normal speech and the other on delexicalised (lowpass-filtered) speech. Aspects of the speakers' productions were subjected to automatic analysis and compared to the listeners' judgments. The results show that: (i) Brazilians perform well in normal speech condition, while the English participants' performance is moderately accurate; (ii) for both groups, performance was lower in the delexicalised speech condition; (iii) simple and multiple linear regressions show that median F0, F0 dispersion, the duration of intonation units, and related parameters can predict the perception of emotional speech by native and non-native speakers of BP.

Paper P7.41 (Presenter at poster: 15:00-16:30)

Simplification of vocal tract shapes with different levels of detail

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We propose a semi-automatic method to regenerate simplified vocal tract geometries from very detailed input (e.g. MRI-based geometry) with the possibility to control the level of detail, while maintaining the overall properties. The simplification procedure controls the number and organization of the vertices in the vocal tract surface mesh and can be assigned to replace complex cross-sections with regular shapes. Six different geometry regenerations are suggested: bent or straight vocal tract centreline, combined with three

different types of cross-sections; namely realistic, elliptical or circular. The key feature in the simplification is that the cross-sectional areas and the length of the vocal tract are maintained. This method may, for example, be used to facilitate 3D finite element method simulations of vowels and diphthongs and to examine the basic acoustic characteristics of the vocal tract in printed physical replicas. Furthermore, it allows for multimodal solutions of the wave equation.

Paper P7.42 (Presenter at poster: 15:00-16:30)
Hidden Markov Model-based approach for nasalized vowels recognition in spontaneous speech

Beke, András and Horváth, Viktória

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In this study, oral and nasalized vowels were analysed based on a Hungarian spontaneous speech corpus. Although such results are generally based on analyses of isolated, read-aloud sentences, the authors suggested it is questionable that they are also true of spontaneous types of speech. There is a lack of agreement in the literature as to which measurable acoustic parameters correlate with nasality. MFCC as a robust feature was presented earlier for nasalized vowel detection combined with SVM classifier. In this research, we investigated the use MFCC and HMM for automatic nasalized vowel recognition. Results support the view i) regressive nasalization could be classified with better accuracy than progressive nasalization, ii) the degree of nasalization strongly depends on the vowel quality, iii) low vowels show a large degree of articulatory nasalization. However, the acoustic consequences are smaller; therefore the perceived degree of nasalization is either similar or lesser than for higher vowels.

Paper P7.43 (Presenter at poster: 15:00-16:30)
Measurement variability in vowel formant estimation: A simulation experiment

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This paper considers sources of error in common vowel formant extraction techniques, investigating the extent to which the temporal point of measurement and software settings influence the formant values obtained. To do this, we report on the results of a vowel measurement simulation where, rather than extracting a single measurement for each vowel token, thousands of measurements are taken for each vowel with varied settings in jittered measurement locations (seeded by measurements from human analysts). Such an undertaking, we argue, yields important insight into the bounds of measurement error in vowel analysis.

Paper P7.44 (Presenter at poster: 15:00-16:30)
Quantitative methods for comparing featural representations

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The basic representational hypothesis in phonology is that segments are coded using a universal set of discrete features. We propose a method for quantitatively measuring how well such features align with arbitrary segment representations. We assess articulatory, spectral, and phonotactic representations of English consonants. Our procedure constructs a

concrete representation of a feature in terms of the pairs it distinguishes, and can be extended to any pair of representations to test the consistency of one with the individual dimensions of the other. We validate the method on our phonetic representations and then show that major natural classes are not well represented in the surface phonotactics.

08:00-18:00	Registration (<i>Hall 1</i>) and Exhibition (<i>Hall 2</i>)				Speaker room (<i>Etive</i>)							
09:00-09:45	ORAL Session 13											
	13.1 Clinical Phonetics: Vowels	13.2 Topics in Perception	13.3 Sociophonetics III	13.4 Artificial Languages and Auditory Illusions	13.5 Tone in Varieties of Chinese	13.6 Dialectology	13.7 Prosody of Sentence Mode	13.8 Arabic Phonetics				
09:45-11:15	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 6 (<i>Hall 1</i>)							
11:15-12:45	DISCUSSANT Session 2											
	D2.1 Phonetics of first language acquisition Prof Mary Beckman	D2.2 Forensic phonetics and speaker characteristics Prof Francis Nolan	D2.3 Sociophonetics Prof Paul Foulkes	D2.4 Speech perception Prof Valerie Hazan	D2.5 Phonetic corpora and big data Dr Martine Adda-Decker							
12:45-14:00	LUNCH				PCICPhS meeting & bids to host ICPHS XIX (<i>Aish 1&2</i>)							
14:00-15:00	PLENARY Lecture 3 (Lomond Auditorium) The neural control of speech: From computational modeling to neural prosthesis Prof Frank Guenther											
15:00-16:30	COFFEE break (<i>Halls 1 & 2</i>)				POSTER Session 7 (<i>Hall 1</i>)							
16:30-17:30	PLENARY Lecture 4 (Lomond Auditorium) What speech synthesis can do for you (and what you can do for speech synthesis) Prof Simon King											
17:30-18:00	CLOSING CEREMONY (Lomond Auditorium)											

DISCUSSANT SESSION 2

D2.1: Phonetics of First Language Acquisition

Friday, August 14, 2015, 11:15-12:45, Carron

Chair: Anja Lowit, Discussant: Mary Beckman

Session D2.1, Paper 1 (11:30-11:45)

Consonant and syllable frequency effects in stop and fricative acquisition in preschool Drehu- and French-acquiring children

*Monnin, Julia; Loevenbruck, Hélène and Vilain, Anne
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Phonological development is often described as reflecting universal constraints, with some consonants or some consonant-vowel sequences assumed to be mastered earlier than others. Differences in order of acquisition are commonly ascribed to universal constraints on production or perception, reflecting biological specificities. Recent studies suggest, however, that language-specific patterns are also observed. To disentangle universal from language-specific constraints, the present study examines Drehu and French acquisition data on stop and fricative consonants (/t/, /d/, /k/, /g/, /s/, /ʃ/), followed by vowels /i, a, u/. Results show that the relative accuracy of stops and fricatives in [i, a, u] contexts in Drehu and French reflect the modulatory influence of language-specific phonotactics on the perceptual and biomechanical constraints claimed to govern the production of consonant and consonant-vowel combinations.

Session D2.1, Paper 2 (11:45-12:00)

Effects of age and vocabulary size on production accuracy and acoustic differentiation of young children's sibilant fricatives

*Nicholson, Hannele; Munson, Benjamin; Reidy, Patrick and Edwards, Jan
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This paper reports preliminary results of a study of the development of sibilant fricatives /s/ and /ʃ/ in young children. Results show that transcribed accuracy increased over the age range studied (28 to 39 months) and that children with larger vocabularies produced fricatives more accurately than ones with smaller vocabularies. Spectral characteristics were measured for productions transcribed to be sibilant. The separation between the spectra of target /s/ and target /ʃ/ also increased over the age range, and was greater in children with larger-sized vocabularies.

Session D2.1, Paper 3 (12:00-12:15)

Crowdsourcing for gradient ratings of child speech: Comparing three methods of response aggregation

*McAllister Byun, Tara; Halpin, Peter and Harel, Daphna
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Impressionistic transcription can obscure systematic phonetic differences, but well-constructed perceptual tasks can draw out these covert contrasts. This study assessed the va-

lidity of gradient speech ratings obtained via online crowdsourcing. Stimuli were 40 /r/ words from children receiving treatment for /r/ misarticulation. Listeners rated each item twice, once using visual analog scaling (VAS) and once using binary rating. Correlations were examined across mean VAS click location, item parameters from an IRT model estimated over binary ratings, and the proportion of listeners scoring a given item "correct" (\hat{p} correct). With 381 listeners, all three measures were highly intercorrelated (Spearman's $r > .98$). We also examined mean rankings over 1000 bootstrap resamples of 9 listeners, a sample size considered practical for real-world applications. There was a robust correlation between mean rankings derived from VAS versus \hat{p} correct. We conclude that crowdsourcing can be a valid and practical source for gradient measures of child speech.

Session D2.1, Paper 4 (12:15-12:30)

Development of lingual motor control in children and adolescents

*Zharkova, Natalia; Hardcastle, William J.; Gibbon, Fiona E. and Lickley, Robin J.
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An important insight into speech motor control development can be gained from analysing coarticulation. Despite a growing number of acoustic and articulatory studies of lingual coarticulation in children, there are conflicting opinions on how the extent of coarticulation changes during childhood. There is also increasing evidence that age-related patterns vary depending on speech sounds involved. The present study employed ultrasound tongue imaging to compare anticipatory V-on-C coarticulation in 13-year-old adolescents and 5-yearold children, using the consonants /p/ and /t/, which differ in the amount of lingual coarticulation in adult speech. For /p/, the two groups had a similar amount of coarticulation. For /t/, both groups had a vowel effect on the extent of tongue bunching, while only adolescents had an effect on the location of tongue bunching. Token-to-token variability in absolute tongue position was larger in the 5-year-olds. We discuss the findings in relation to previous studies and existing theories.

D2.2: Forensic Phonetics and Speaker Characteristics

Friday, August 14, 2015, 11:15-12:45, Dochart

Chair: Ailbhe Ní Chasaide, Discussant: Francis Nolan

Session D2.2, Paper 1 (11:30-11:45)

Speaker-idiosyncrasy in pausing behavior: Evidence from a cross-linguistic study

*Kolly, Marie-José; Leemann, Adrian; Boula de Mareüil, Philippe and Dellwo, Volker
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Phoneticians study acoustic speech signals. But what about the aspects of speech where the signal is silent? The present study investigated speakers' pausing behavior in their native and non-native speech. Pausing measures were applied in order to study between-speaker and within-speaker variability, where within-speaker variability was introduced by recording speakers in their native Zurich German, and

in their second languages English and French. Results showed that pausing measures in the form of pause numbers and pause durations are speaker-specific. Furthermore, this speaker-specificity became evident across different languages. Results are discussed in the context of forensic voice comparison.

Session D2.2, Paper 2 (11:45-12:00)

Speaker variability in the production of coarticulated tones

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Previous studies on lexical tone as a speaker-discriminант feature focused mainly on tone production in isolation or with a fixed tonal context. The present study reports an experiment on the production of Cantonese and Mandarin tones in different tonal contexts and speaking rates. Results show that while speakers show considerable variation in tone production in both languages, speaking rate and tonal context also play a role in the speaker-discriminating power of tone.

Session D2.2, Paper 3 (12:00-12:15)

On the speaker specificity of hesitation markers

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The occurrence of hesitation markers is generally considered to be part of the verbal planning process. It is also a feature which is of potential importance to the forensic application of phonetics if hesitation behaviour could be linked to individual speakers. This study examines a total of eight female speakers on three different days. It can be demonstrated that, even though results vary across sessions, subjects exhibit distinct patterns of hesitation marker usage. This pertains to the number as well as the type of hesitations marker, which makes this feature a potential candidate for forensic investigations.

Session D2.2, Paper 4 (12:15-12:30)

The vocal tract as a biometric: output measures, inter-relationships, and efficacy

French, Peter; Foulkes, Paul; Harrison, Philip; Hughes, Vincent and Stevens, Louisa

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This paper explores methods for characterising individual voices using different vocal tract output measures. Mel frequency cepstral coefficients (MFCCs), long-term formant distributions (LTFDs) and scores based on vocal profile analysis (VPA) of long-term supralaryngeal settings were extracted from the same corpus of recordings. Distances between speakers were calculated and used to test the inter-relationships between the three output measures. Strong correlations were found between the MFCC and LTFD distances, while considerably weaker correlations were found between the acoustic measures and the VPA-based distances. This suggests that while the two measures of acoustic output provide similar information, the auditory VPA offers different information relevant for voice characterisation. In a forensic context this finding is important since it suggests that it may be possible to complement acoustic analysis with VPA to improve system performance.

D2.3: Sociophonetics

Friday, August 14, 2015, 11:15-12:45, Lomond

Chair: Lauren Hall-Lew, Discussant: Paul Foulkes

Session D2.3, Paper 1 (11:30-11:45)

Static vs dynamic perspectives on the realization of vowel nuclei in West Australian English

Docherty, Gerard; Gonzalez, Simon and Mitchell, Nathaniel
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This paper reports on an exploratory study of the application of different types of analysis method to the characterization of the acoustic properties of vowel realization in the performance of speakers of West Australian English (West AusE). Tense monophthongs and diphthongs produced in a word list by 18 speakers of West AusE were analysed using three different methods, two static and one dynamic. Results differ across the three methods with the dynamic analysis yielding substantially more detail and differentiation between and within vowel categories. Our findings enhance knowledge of a variety which has received scant attention in existing phonetic studies of AusE, and more generally contribute to the on-going discussion in the literature about which approach to acoustic analysis provides the best means of capturing the properties of vowel realization and variability.

Session D2.3, Paper 2 (11:45-12:00)

A dynamic acoustic view of real-time change in word-final liquids in spontaneous Glaswegian

Stuart-Smith, Jane; Lennon, Robert; Macdonald, Rachel; Robertson, Duncan; Sóskuthy, Márton; José, Brian and Evers, Ludger

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This paper investigates the acoustic evidence for real-time change in word-final liquids (/r/ and /l/) in a small-scale study of older male Glaswegian speakers recorded from the 1970s to the 2000s. A dynamic acoustic analysis of the first three formants across the duration of the rhyme (vowel+liquid sequence) shows significant effects of preceding and following phonetic context on the course and trajectories of the formant tracks. We also find raising of F3 for /r/ in speakers who were born and recorded more recently; F2 is lowering for /l/ in the same speakers. Comparison of F2 across the two word-final liquids suggests that /r/ is clearer than /l/ for this Scottish dialect; interestingly the polarity in resonance between /r/ and /l/ is increasing over time.

Session D2.3, Paper 3 (12:00-12:15)

Switching language dominance for ideological reasons: A study of Galician new speakers' speech production and perception

Tomé Lourido, Gisela and Evans, Bronwen G.
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In minority language communities, language choice may be related to identity. In the bilingual community of Galicia, some speakers switch language dominance at a late stage in development, normally during adolescence. These

'new speakers', neofalantes, are originally dominant in Spanish but switch to Galician for cultural or ideological reasons. The present study investigated the consequences of this language shift for neofalantes' production and perception of Galician. The results demonstrated that neofalantes produced intermediate categories that were different from those of Spanish and Galician-dominants, but that changes in production were not accompanied by changes in perception. Although these findings might suggest that neofalantes process their new, dominant language through the categories of their former dominant language, another possibility is that they change aspects of their production to try to fit in with a new group of speakers, Galician-dominants, whilst retaining some Spanish variants to show belonging to the neofalantes community.

Session D2.3, Paper 4 (12:15-12:30)

Entrainment as a basis for co-ordinated actions in speech

*Ogden, Richard and Hawkins, Sarah
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This paper asks how rhythmicity is used to manage speaker transition in spontaneous talk and how temporal alignment helps to achieve interactional alignment. 56 Question + Answer (Q+A) pairs were analysed. 44 (79%) Qs ended rhythmically: in their last few accented syllables, f0 prominences were quasi-periodic. Of the As to these rhythmic Qs, 32 (73%) began with the same periodicity as the Q. As with non-rhythmic entry into 'turn space' set up by a rhythmic Q were sequentially and interactionally complex. Rhythmic A entries included accented syllables, in-breaths, clicks and nods, suggesting 'embodied' rather than solely 'linguistic' temporal entrainment. Interactional alignment thus seems to exploit temporal entrainment in the vicinity of turn boundaries, like that established for musicians.

D2.4: Speech Perception

Friday, August 14, 2015, 11:15-12:45, Alsh

Chair: Alice Turk, Discussant: Valerie Hazan

Session D2.4, Paper 1 (11:30-11:45)

Individual differences in perception of unfamiliar speech

*Baese-Berk, Melissa; Bent, Tessa; Borrie, Stephanie and McKee, Megan
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Substantial individual differences in speech perception emerge under adverse listening conditions, including when perceiving unfamiliar speech. In the present study, individual differences in word recognition for three varieties of unfamiliar speech—Spanish-accented English, Irish-accented English, and dysarthric speech—were investigated. We asked whether the ability to perceive these unfamiliar, and highly variable, speech signals correlated with performance on three linguistic and non-linguistic tasks. Individual word recognition scores were significantly correlated across all three types of speech. Further, cognitive and perceptual flexibility as well as receptive vocabulary were significant

predictors of word recognition accuracy. The findings presented here are an important step in understanding what makes a listener successful at speech perception in adverse conditions, suggesting that both linguistic and non-linguistic cognitive abilities support word recognition with speech types that deviate from typical native dialect norms.

Session D2.4, Paper 2 (11:45-12:00)

Development of perceptual flexibility

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In multicultural and multilingual societies, perceptual flexibility – the ability to recognize words with novel pronunciations, such as those encountered in unfamiliar dialects and accents – is an essential skill for children's receptive language development. Without this ability frequent errors in mapping input to words in the lexicon would occur. To assess how unfamiliar accents impact word recognition during development, the word recognition abilities of 5-to 12-year-old children and young adults were tested with native-and nonnative-accented speech in quiet and noise. Results showed that perception of non-native speech develops slowly with adult-like abilities emerging only in adolescence. Perceptual flexibility may emerge late in development because extensive linguistic input and knowledge are required to accurately map novel acoustic-phonetic patterns onto known words. Compared to familiar native accents, the accurate perception of non-native accents may also more heavily recruit cognitive skills that continue to develop into adolescence (e.g. working memory, executive functions).

Session D2.4, Paper 3 (12:00-12:15)

Older listeners' decreased flexibility in adjusting to changes in speech signal reliability

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Under noise or speech reductions, young adult listeners flexibly adjust the parameters of lexical activation and competition to allow for speech signal unreliability. Consequently, mismatches in the input are treated more leniently such that lexical candidates are not immediately deactivated. Using eyetracking, we assessed whether this modulation of recognition dynamics also occurs for older listeners. Dutch participants (aged 60+) heard Dutch sentences containing a critical word while viewing displays of four line drawings. The name of one picture shared either onset or rhyme with the critical word (i.e. was a phonological competitor). Sentences were either clear and noise-free, or had several phonemes replaced by bursts of noise. A larger preference for onset competitors than for rhyme competitors was observed in both clear and noise conditions; performance did not alter across condition. This suggests that dynamic adjustment of spoken-word recognition parameters in response to noise is less available to older listeners.

Session D2.4, Paper 4 (12:15-12:30)

Is perception personal?

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Listeners categorized an /s-/ continuum in front of the vowels [u, a, i] spoken by two male and two female speak-

ers. One of each gender was more typical than the other. Listeners' adjustments for these vowel and speaker characteristics were associated to their self-ratings with respect to both the specific personality traits measured by the Autism-Spectrum Quotient and the more general Big Five personality traits.

D2.5: Phonetic Corpora and Big Data

Friday, August 14, 2015, 11:15-12:45, Boisdale

Chair: Bernd Möbius, Discussant: Martine Adda-Decker

Session D2.5, Paper 1 (11:30-11:45)

Word frequency effects on homophonous words in Mandarin Chinese

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Previous work on the effects of word usage frequency on production has found a significant correlation between the usage frequency and duration of the word. This study examines usage frequency effects on the production of homophonous words in a corpus of Mandarin Chinese, seeking to determine the validity of previous results crosslinguistically. Analysis of the corpus reveals a similar pattern to that found in spoken English, but with additional differences at the high and low end of the usage frequency spectrum.

Session D2.5, Paper 2 (11:45-12:00)

Structured variability in acoustic realization: a corpus study of voice onset time in American English stops

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Talkers differ greatly in the acoustic realization of speech sounds, a source of signal variation that must be overcome by human and machine listeners. The present study examined talker variability in voice onset time (VOT) across the six word-initial stop consonant categories (/ptkbdg/) of American English. Employing a large corpus of productions from more than 100 speakers, we replicated previous findings of significant variation in overall and stop-specific VOT means. However, we also identified several statistical generalizations within and across phonetic patterns of individual talkers. Speaking rate accounted for a large portion of VOT variance, with talkers differing considerably in the strength of this relationship. Stop category means showed high pairwise correlations, particularly among /ptk/. Additionally, stop-specific means and variances were highly correlated. The structured variation present in VOT could be exploited by both listeners and automatic recognition systems to facilitate robust perceptual adaptation from limited exposure to novel talkers.

Session D2.5, Paper 3 (12:00-12:15)

Impact of frame rate on automatic speech-text alignment for corpus-based phonetic studies

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Phonetic segmentation is the basis for many phonetic and

linguistic studies. As manual segmentation is a lengthy and tedious task, automatic procedures have been developed over the years. They rely on acoustic Hidden Markov Models. Many studies have been conducted, and refinements developed for corpus based speech synthesis, where the technology is mainly used in a speaker-dependent context and applied on good quality speech signals. In a different research direction, automatic speech-text alignment is also used for phonetic and linguistic studies on large speech corpora. In this case, speaker independent acoustic models are mandatory, and the speech quality may not be so good. The speech models rely on 10 ms shift between acoustic frames, and their topology leads to strong minimum duration constraints. This paper focuses on the acoustic analysis frame rate, and gives a first insight on the impact of the frame rate on corpus-based phonetic studies.

Session D2.5, Paper 4 (12:15-12:30)

The influence of prosodic context on high vowel devoicing in spontaneous Japanese

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In the description of phonological processes which apply across word boundaries, the notion of "pause" plays an important role. Pauses may be part of the trigger for an alternation, or they may block it. Both of these have been claimed to hold for the process of high vowel devoicing (HVD) in Tokyo Japanese. How could pauses both condition and inhibit the same sound change process? The present study addresses this question by breaking down the notion of pause into two different components: the physical, silent pause, and the subjective measure of "boundary strength". Analysis of a large corpus of spontaneous Japanese [9] shows that both of these factors have a major effect on the application of HVD, and they are crucially independent of one another.

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