#NewDirLangEvo

directions in language evolution research

Introduction to the theme session

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[3]University of Tallinn

SLE 2018 - 51st Annual Meeting of the Societas Linguistica Europaea, Tallinn, Estonia

NEW directions in language evolution research
Introduction to the theme session
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evolutionary linguistics
SLE
Societas
Linguistica
Europaea

What we mean by ‘language evolution’

“The hardest problem in science”
Kirby & Christiansen (2002)

“A mystery”
Hauser et al. (2014)

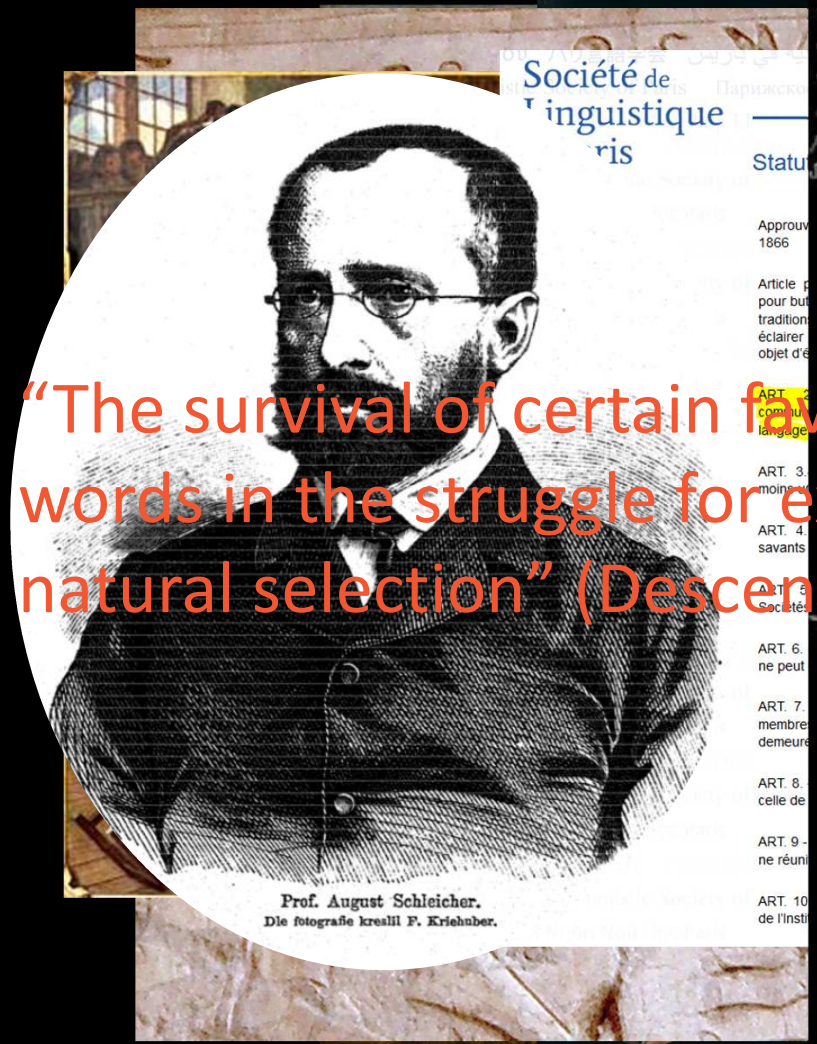
“An embarrassment to evolutionary theory”
Premack (1986)

burgeoning literature, most of which in my view is total nonsense.”
Chomsky (2011)

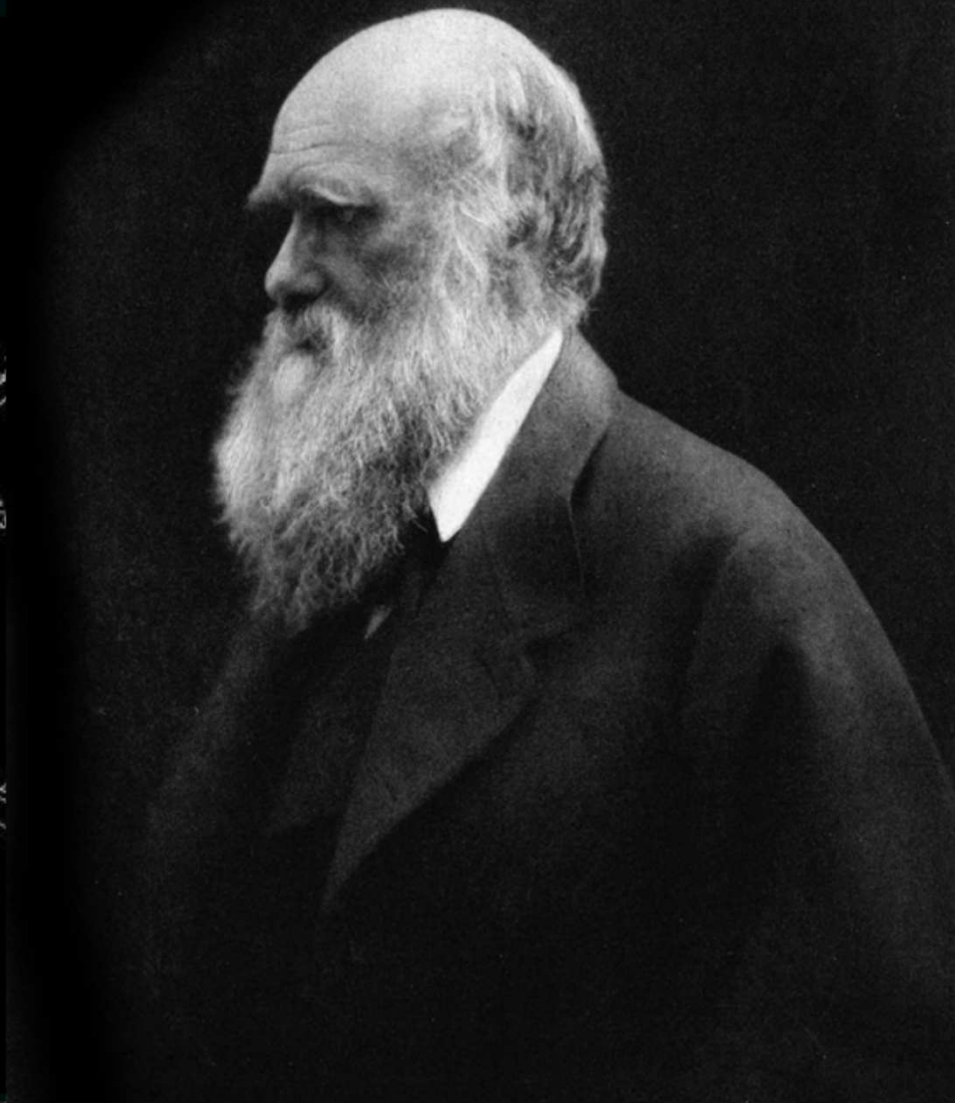
Why do we speak (while animals don't) ?

Where do languages come from?

The 'DARK AGE' of LE research



"The survival of certain favoured words in the struggle for existence is natural selection" (Descent 1: 61).



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The ‘Coming-of Age’ of LE research

BEHAVIORAL AND BRAIN SCIENCES (1990) 13, 707–784
Printed in the United States of America

Natural language and natural selection

Steven Pinker[a] and Paul Bloom[b]
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Electronic mail: [a]steve@psyche.mit.edu and [b]bloom@rvax.ccit.arizona.edu

Abstract: Many people have argued that the evolution of the human language faculty cannot be explained by Darwinian natural selection. Chomsky and Gould have suggested that language may have evolved as the by-product of selection for other abilities or as a consequence of as-yet unknown laws of growth and form. Others have argued that a biological specialization for grammar is incompatible with every tenet of Darwinian theory – that it shows no genetic variation, could not exist in any intermediate forms, confers no selective advantage, and would require more evolutionary time and genomic space than is available. We examine these arguments and show that they depend on inaccurate assumptions about biology or language or both. Evolutionary theory offers clear criteria for when a trait should be attributed to natural selection: complex design for some function, and the absence of alternative processes capable of explaining such complexity. Human language meets these criteria: Grammar is a complex mechanism tailored to the transmission of propositional structures through a serial interface. Autonomous and arbitrary grammatical phenomena have been offered as counterexamples to the position that language is an adaptation, but this reasoning is unsound: Communication protocols depend on arbitrary conventions that are adaptive as long as they are shared. Consequently, language acquisition in the child should systematically differ from language evolution in the species, and attempts to analogize them are misleading. Reviewing other arguments and data, we conclude that there is every reason to believe that a specialization for grammar evolved by a conventional neo-Darwinian process.

SCIENCE'S COMPASS • REVIEW
REVIEW: NEUROSCIENCE

The Faculty of Language: What Is It, Who Has It, and How Did It Evolve?

Marc D. Hauser,[1]* Noam Chomsky,[2] W. Tecumseh Fitch[3]

We argue that an understanding of the faculty of language requires substantial interdisciplinary cooperation. We suggest how current developments in linguistics can be profitably wedded to work in evolutionary biology, anthropology, psychology, and neuroscience. We submit that a distinction should be made between the faculty of language in the broad sense (FLB) and in the narrow sense (FLN). FLB includes a sensory-motor system, a conceptual-intentional system, and the computational mechanisms for recursion, providing the capacity to generate an infinite range of expressions from a finite set of elements. We hypothesize that FLN only includes recursion and is the only uniquely human component of the faculty of language. We further argue that FLN may have evolved for reasons other than language, hence comparative studies might look for evidence of such computations outside of the domain of communication (for example, number, navigation, and social relations).

If a martian graced our planet, it would be struck by one remarkable similarity among Earth's living creatures and a key difference. Concerning similarity, it would note that all living things are designed on the basis of highly conserved developmental systems that read an (almost) universal language encoded in DNA base pairs. As such, life is arranged hierarchically with a foundation of discrete, unblendable units (codons, and, for the most part, genes) capable of combining to create increasingly complex and virtually limitless varieties of both species and individual organisms. In contrast, it would notice the absence of a universal code of communication (Fig. 1).

If our martian naturalist were meticulous, it might note tures; it might further note that the human faculty of language appears to be organized like the genetic code—hierarchical, generative, recursive, and virtually limitless with

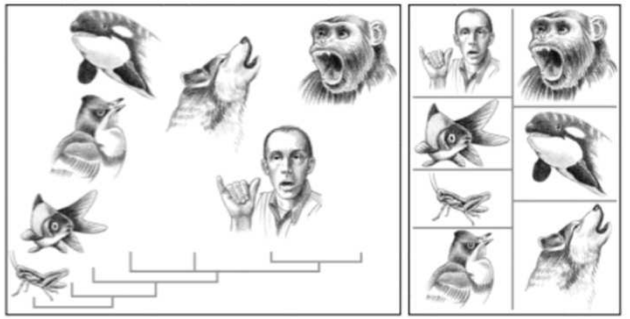


Fig. 1. The animal kingdom has been designed on the basis of highly conserved developmental systems that read an almost universal language coded in DNA base pairs. This system is shown on the left in terms of a phylogenetic tree. In contrast, animals lack a common universal code of communication, indicated on the right by unconnected animal groups. [Illustration: John Yanson]

question of language evolution, and of how humans acquired the faculty of language.

In exploring the problem of language evolution, it is important to distinguish between questions concerning language as a communicative system and questions concerning the computations underlying this system, such as those underlying recursion. As we argue below, many acrimonious debates in this field have been launched by a failure to distinguish between these problems. According to one view (1), questions concerning abstract computational mechanisms are distinct from those concerning communication, the latter targeted at problems at the interface between abstract computation and both sensory-motor and conceptual-intentional interfaces. This view should not, of course, be taken as a claim against a relationship between compu-

The ‘Coming-of Age’ of LE research

‘Biolinguistics’

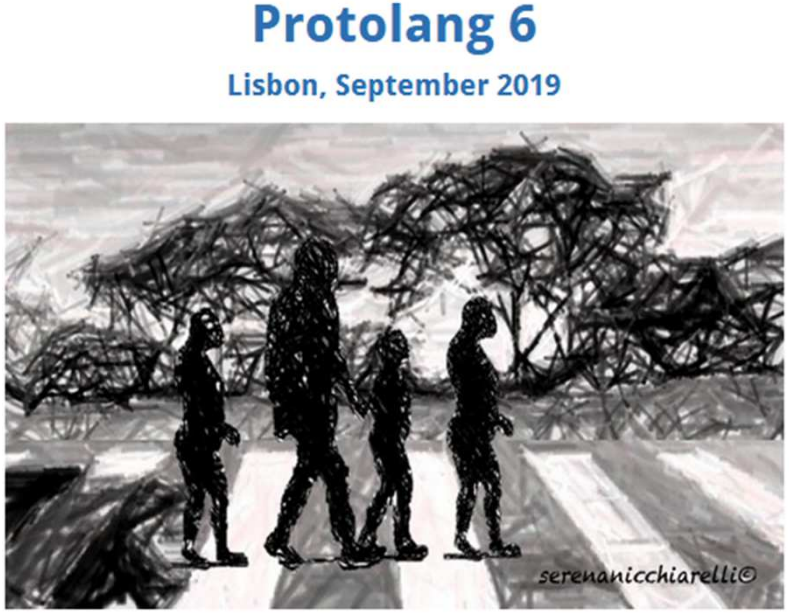
‘Evolutionary linguistics’

b|iolinguistics i|nitiative b|arcelona

COGBIO
Department of Cognitive Biology

The ‘Coming-of Age’ of LE research

(Next Evolang: 2020 in Brussels)



(Distinguished scholars at the 2018 SLE workshop)

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What do we mean by language evolution

Haspelmath (2016)

"Thus, we now have three senses of the term “evolution” in the context of the study of languages:

(1) **origin of language** as a human-specific trait (Pinker & Bloom, and also most of McMahon & McMahon 2012)

(2) **language change** studied from the perspective of **variation and selection** (Croft 2000, etc.)

(3) language patterns and **language change at a global level** (Everett et al. and related work)

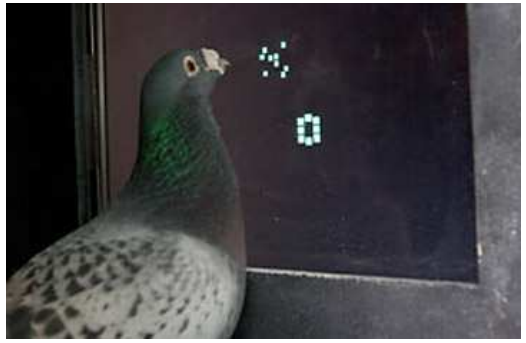
And this does not even include grammaticalization (Bybee et al. 1994)."

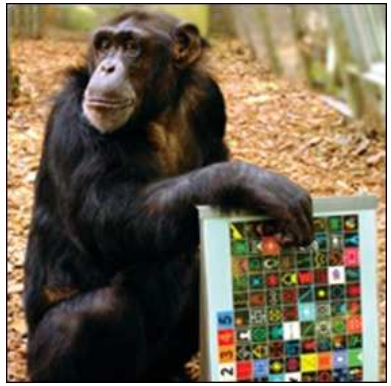
Methods for studying Language Evolution

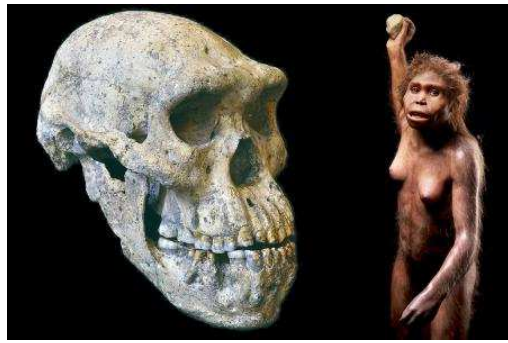
Methods and approaches

"Empirical approaches to the study of language evolution" (Fitch 2017 *Psychon Bull Rev*):

- Comparative cognition/biology
- Neuroscientific data
- paleontological data
- genetic and paleogenetic data
  - comparative genomics
  - comparing human populations



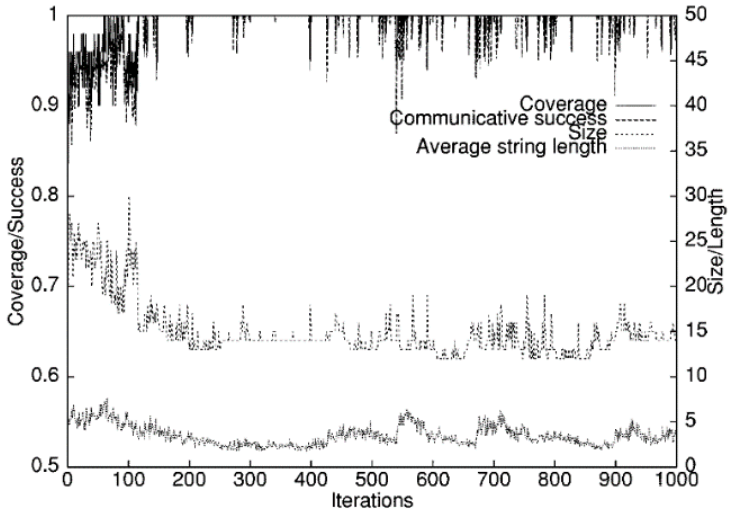


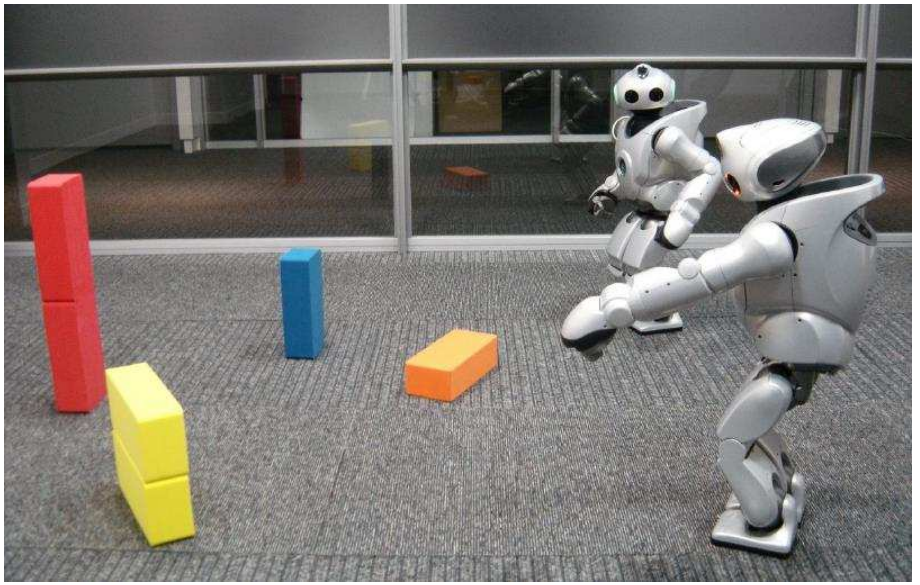


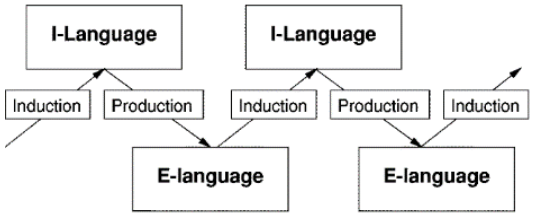
Vocal learning in other species

Bolhuis et al. 2010 *Nat Rev Neurosci*
Janik 2014 *Curr Opin Neurobiol*
Ravignani 2016 *Front Neurosci*
Vernes 2017 *Psych Bull Rev*

Cultural evolution of language: Simulations/models



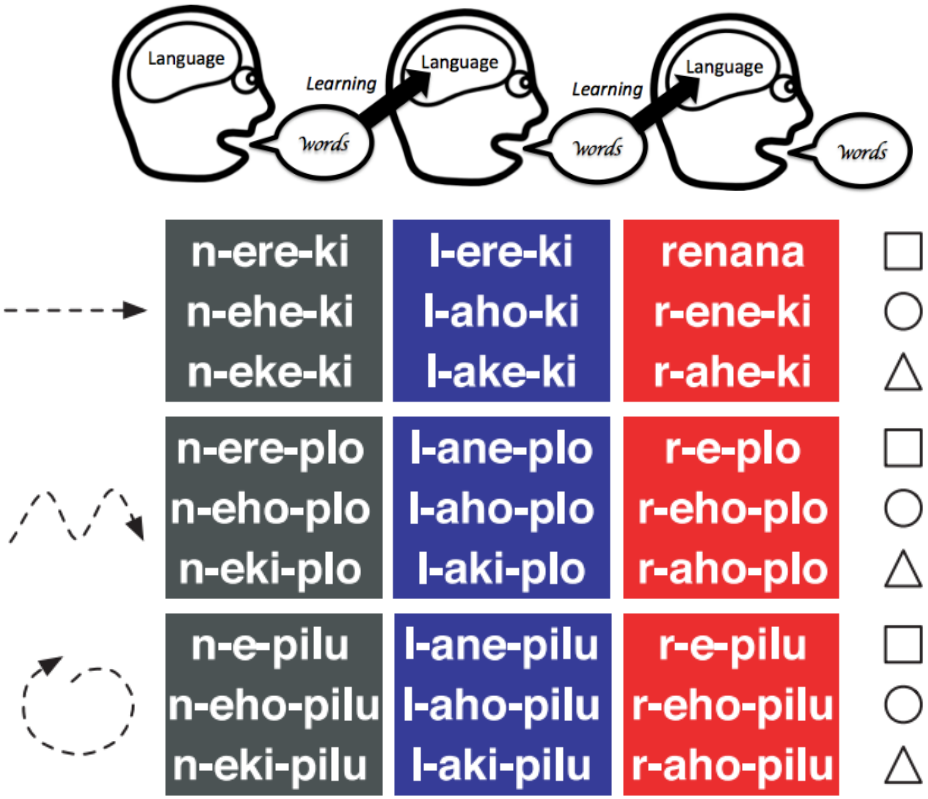




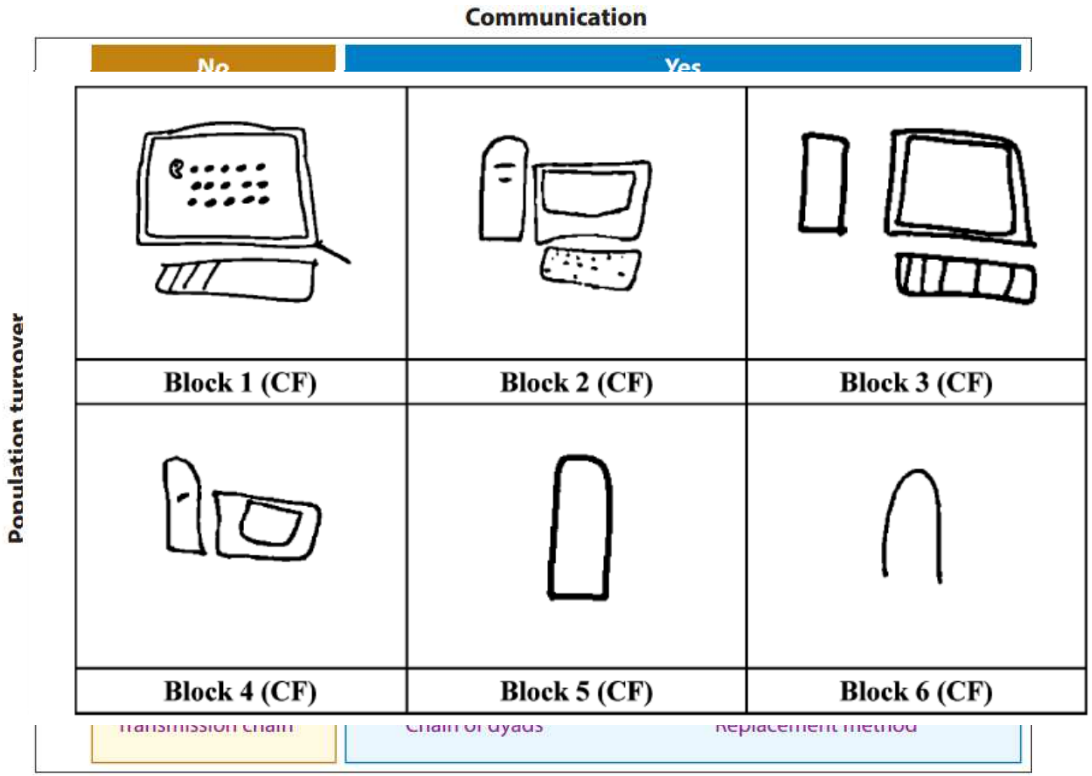
Kirby 2001 *IEEE Trans Evol Comp*
Kirby 2017 *Psychon Bull Rev*

Steels 1998 *Artificial Intelligence*
Steels 2015 *The Talking Heads Experiments.* Lang Sci Press

Cultural evolution of language: experiments



Kirby et al. 2008 *PNAS*



Galantucci 2005 *Cogn Sci*

Tamariz 2017 *Annu Rev Linguist*

Garrod et al. 2007 *Cogn Sci*

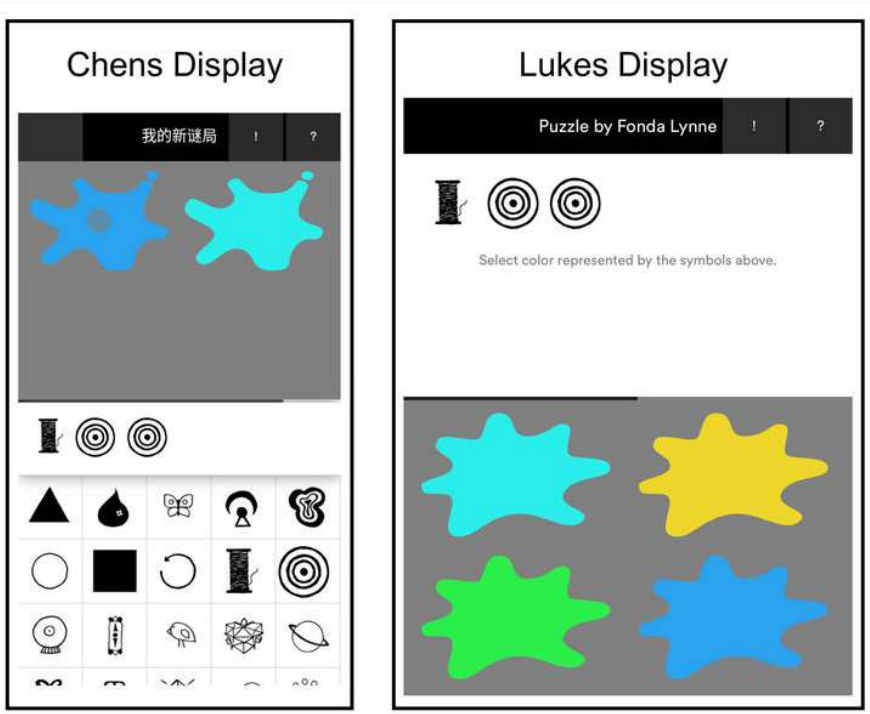
Cultural evolution of language: experiments

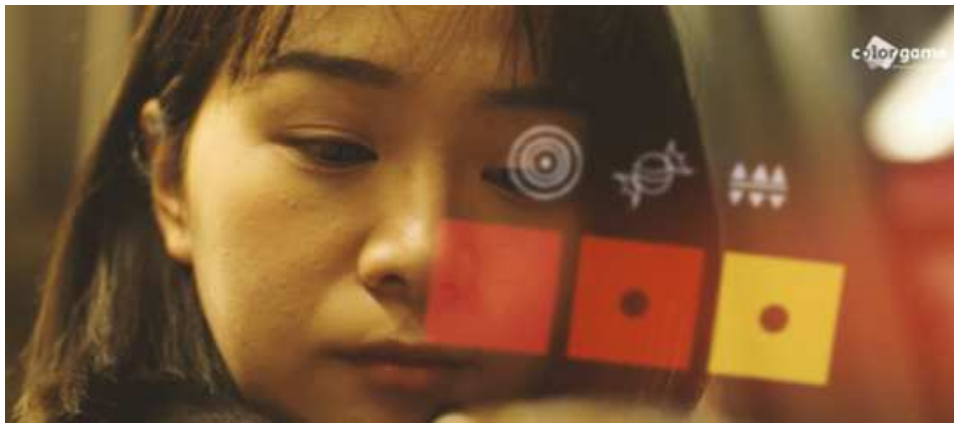
Nölle et al., in progress

Cultural evolution of language: experiments

color game
the science of communication

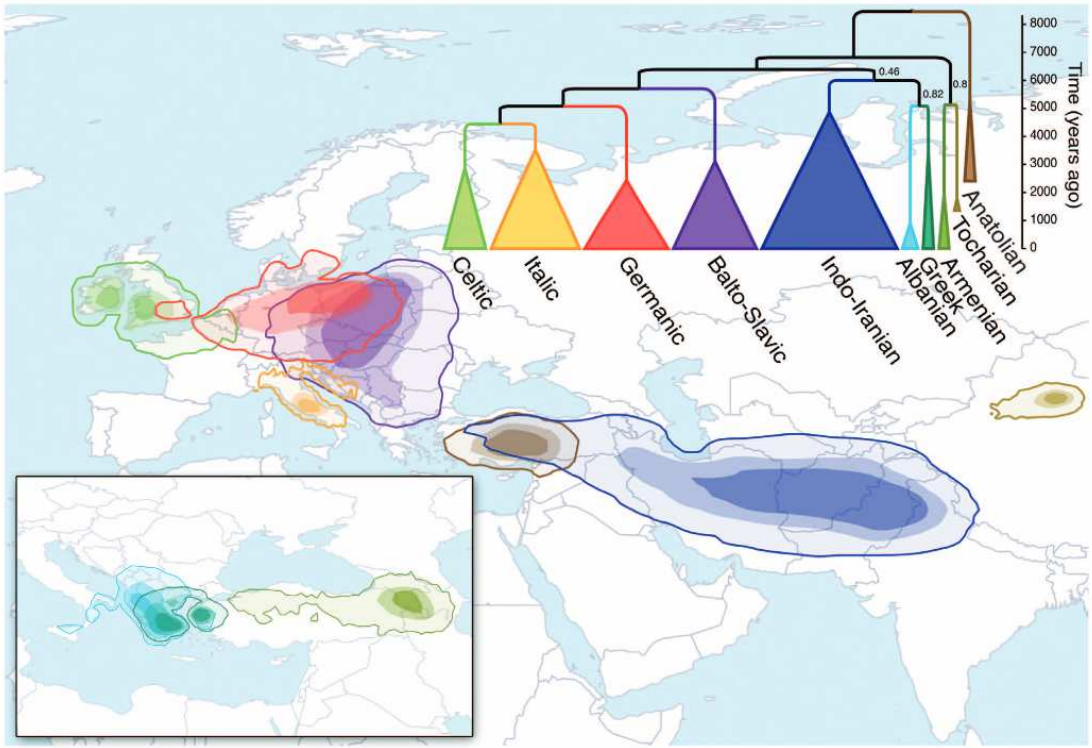
Max-Planck-Institut
für Menschheitsgeschichte
Max Planck Institute
for the Science of Human History



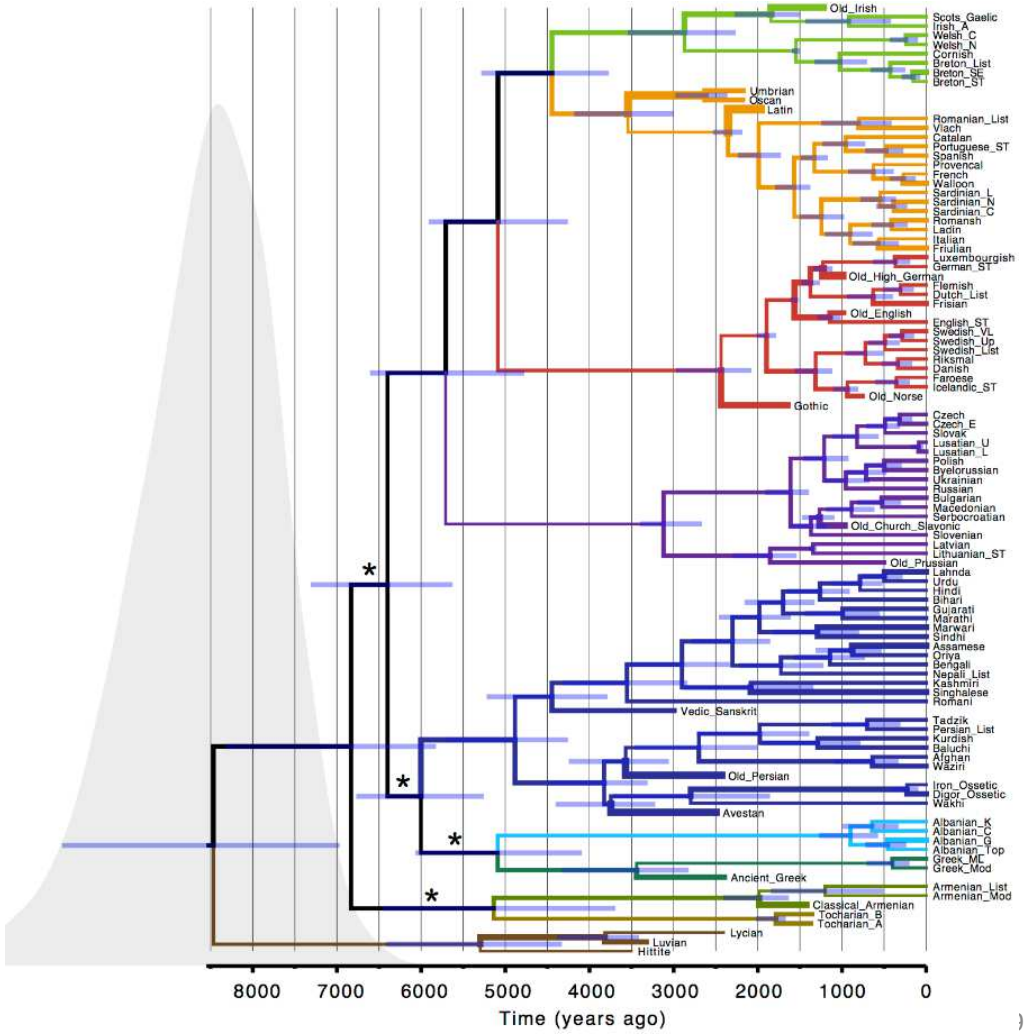


Morin et al. 2018 *JoLE*

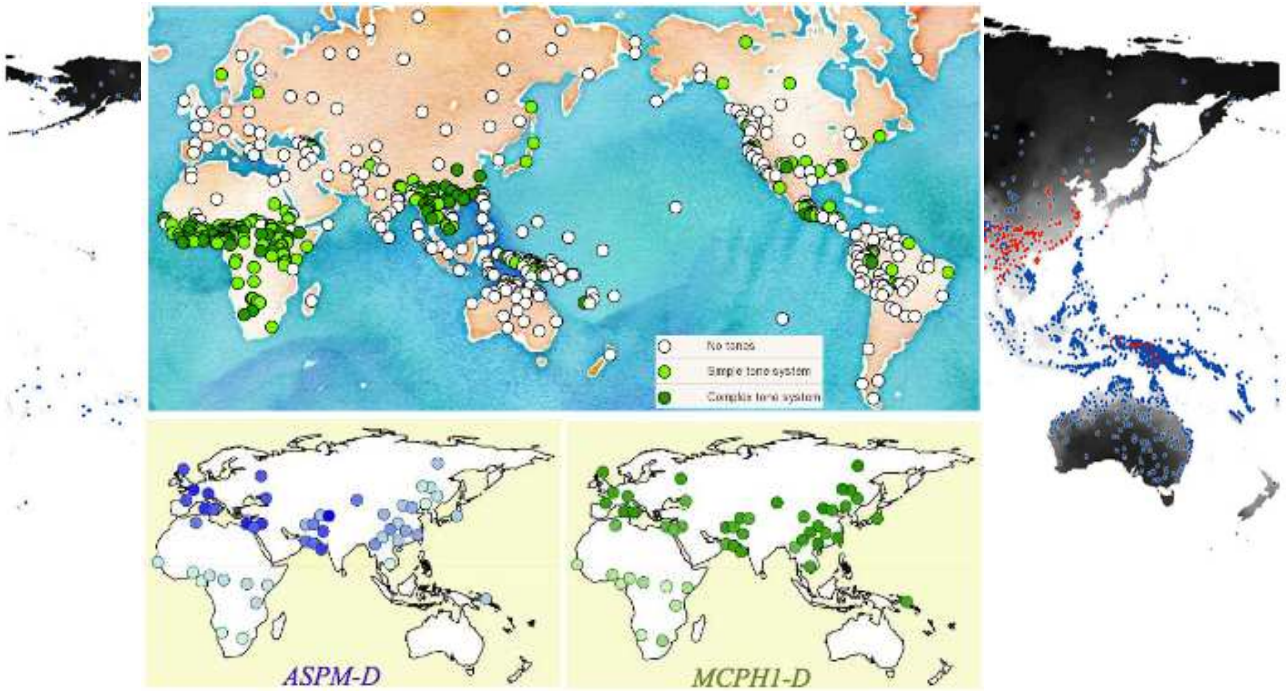
Phylogenetic trees



Bouckaert et al. 2012 *Science*



Language × environment



Everett, Blasi & Roberts 2015 *PNAS*
Dediu & Ladd 2007 *PNAS*

Trends in Cognitive Sciences
CellPress

Opinion

Why Are There Different Languages? The Role of Adaptation in Linguistic Diversity

Gary Lupyan[1,*] and Rick Dale[2]

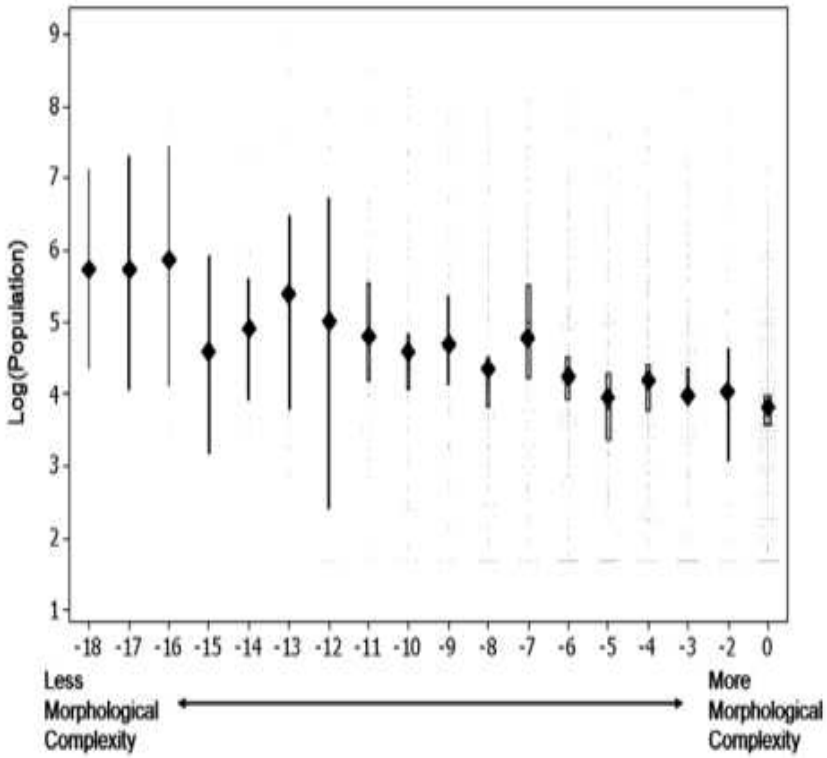
Why are there different languages? A common explanation is that different languages arise from the gradual accumulation of random changes. Here, we argue that, beyond these random factors, linguistic differences, from sounds to grammars, may also reflect adaptations to different environments in which the languages are learned and used. The aspects of the environment that could shape language include the social, the physical, and the technological.

Trends

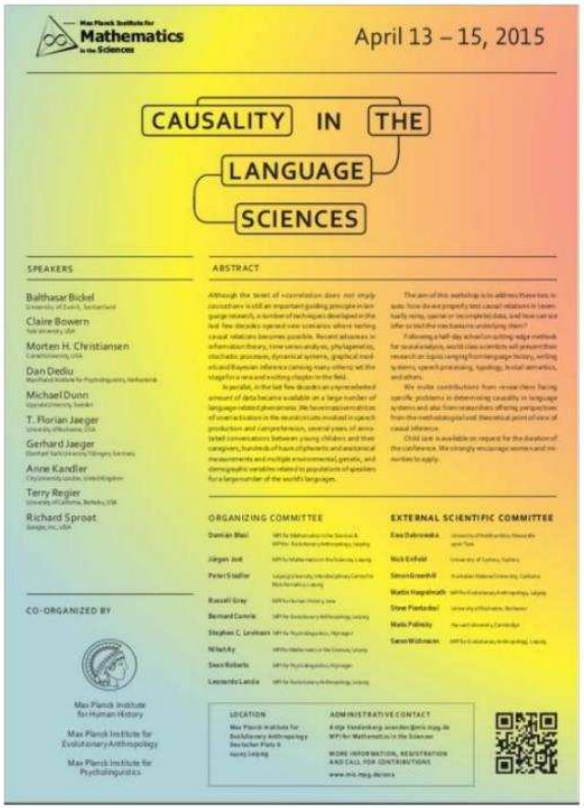
It is commonly thought that humans speak different languages simply because the languages drifted apart due to the gradual accumulation of changes.

We challenge this assumption by

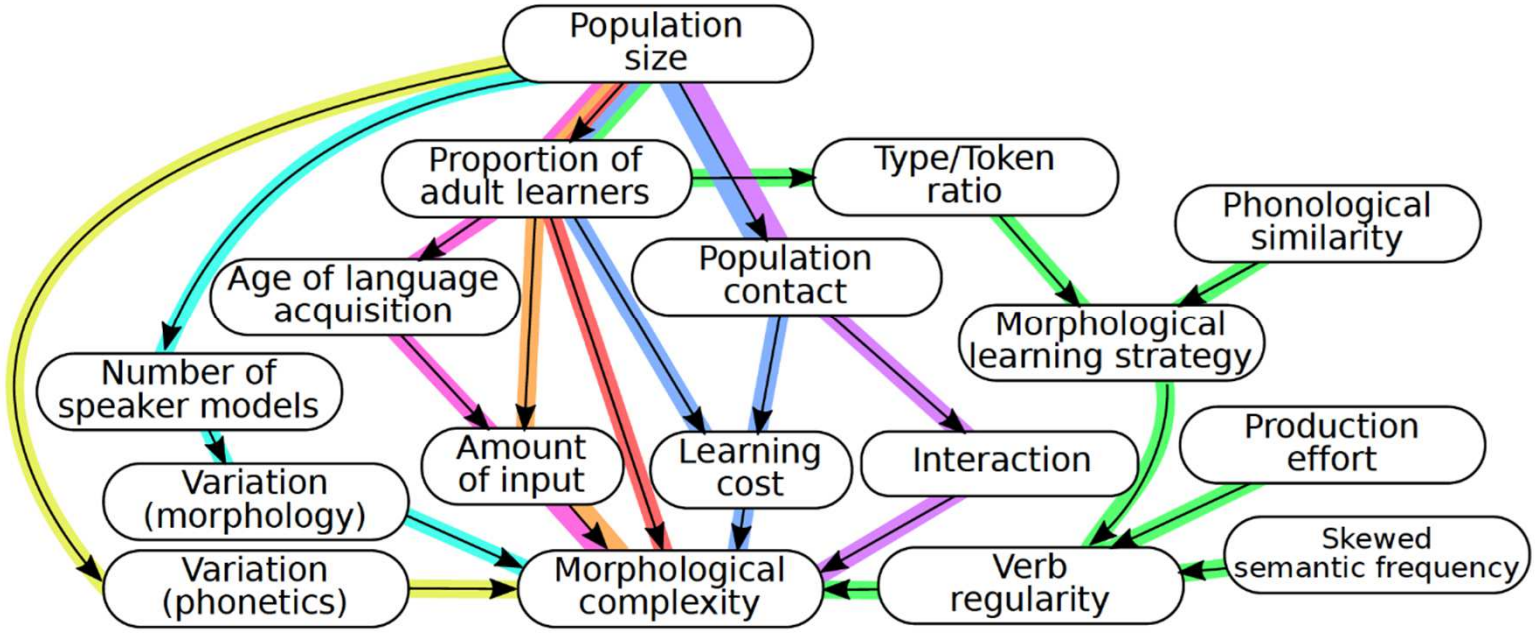
Language × environment



Lupyan & Dale 2010 *PLOS ONE*



Language × environment



CHIELD

chield.excd.org

Ardell et al. (2016); Atkinson et al. (2016); Bentz and Berdicevskis (2016); Bentz and Winter (2013); Lupyan and Dale (2010); Cuskley and Loreto (2016); Atkinson et al. (2016)

Roberts 2018 *Evolang*

Workshop program

Workshop program: General information

Topics

Experimental/Behavioural	Language Dynamics & Change
Origins of Language	Evolution of Semantics
Large-scale Patterns & Extralinguistic Influences	

Cancellations

Andreas **Baumann** & Nikolaus **Ritt**	*On the relative impact of extra-linguistic correlates in linguistic evolution: a systematic sensitivity analysis of variables associated with population size*
Sverker **Johansson**	*Clues to language evolution from a massive dataset with typology, phonology, and vocabulary from many languages*
Michael **Collins**	*The Co-Evolution of Language and Object-Throwing*

Workshop program: General information

Topics

Experimental/Behavioural	Language Dynamics & Change
Origins of Language	Evolution of Semantics
Large-scale Patterns & Extralinguistic Influences	

Additional Talk! Sa, 9.30 Room 5

Ezequiel **Koile**, Simon J. **Greenhill**, Tom **Güldemann**, Remco **Bouckaert** and Russell D. **Gray**

Bantu Expansion: A phylogeographic study

Workshop program: Thursday

Experimental	14.30 - 14.55	Jennifer **Culbertson**	*Noun phrase word order across languages reflects simplicity and naturalness*
	15.00 - 15.25	Gareth **Roberts**	*Why sociolinguistics and language evolution should talk more*
	15.30 - 16.00	**Coffee Break**	
Patterns & Extraling.	16.00 - 16.25	Russel **Gray**, Adam **Powell**, Cosimo **Posth**, Annemarie **Verkerk** & Mary **Walworth**	*Waves of history and layers of evidence: what can the combination of linguistics and genetics tell us about the nature, timing and impact of Papuan contact on the Austronesian languages of Vanuatu?*
	16.30 - 16.55	Niklas **Johansson**	*Triangulating sound symbolism: where to find it and how to create it*
	19.00	**Joint WS dinner**	Café *Must Puudel*, Googleform (see email!) Meet at 18.40 at ASTRA entrance

Workshop program: Friday (morning)

Patterns & Extraling.	9.00 - 9.25	Simon **Greenhill**, Lindell **Bromham**, Marcel **Cardillo**, Hilde **Schneemann** & Xia **Hu**	*Testing the complex relationship between language diversity, biodiversity, and ecology*
	9.30 - 9.55	Cristina **Guardiano** & Giuseppe **Longobardi**	*Syntactic theory and human diversity*
	10.00 - 10.55	**Plenary**	(Maria Koptjevskaja-Tamm, Stockholm)
	11.00 - 11.30	**Coffee Break**	
Dynamics & Change	11.30 - 11.55	Gerhard **Jaeger**	*Typologies in equilibrium*
	12.00 - 12.25	Andres **Karjus,** Richard A. **Blythe**, Simon **Kirby** & Kenny **Smith**	*Two problems and solutions in evolutionary corpus-based language dynamics research*
	12.30 - 12.55	Borja **Herce**	Language evolution in the absence of functional pressures

Workshop program: Friday (afternoon)

	13.00 - 14.00	**Lunch Break**	
Evol. of Semantics	14.00 - 14.25	Dariusz **Kalociński**	*Scalar language under communicative pressure: road to "most"*
Evol. of Semantics	14.30 - 14.55	Fausto **Carcassi**, Marieke **Schouwstra** & Simon **Kirby**	*The Evolution of Scalar Terms' Semantic Structure*
Evol. of Semantics	15.00 - 15.25	Ariel **Cohen**	*A Natural Prehistory of Negation*
	15.30 - 16.00	**Coffee Break**	
Origins	16.00 - 16.25	Bridget **Samuels**, Pedro T. **Martins**, Tom **O'Rourke**, Alejandro **Muñoz**, Saleh **Alamri**, Constantina **Theofanopoulou** & Cedric **Boeckx**	*Rethinking neoteny and neuroplasticity in language evolution*
	16.30 - 16.55	**Discussion**	

Questions

Example questions for discussion

What are the limits of language evolution research?

What promising *new directions* are missing from this workshop?

Are we in fact "coming of age"? Does language evolution research in the near future look different from 5 years ago?

How should we approach new frontiers? Large interdisciplinary groups? Many small projects?

Keynote

Jennifer Culbertson

Noun phrase word order across languages reflects simplicity and naturalness