Vanessa Ferdinand

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EDUCATION

2010 - 2015	Ph.D. Evolution of Culture and Language, University of Edinburgh
2006 - 2008	M.Sc. Cum Laude, Brain and Cognitive Sciences
	University of Amsterdam
2000 - 2003	B.A. Cum Laude, Linguistics, University of Georgia
2000 - 2003	B.A. Cum Laude, Anthropology, University of Georgia

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PROFESSIONAL APPOINTMENTS

2018 – 2022	Research Fellow in Computational Cognitive Science
	University of Melbourne
2014 – 2018	Omidyar Fellow, Santa Fe Institute
2014 – 2018	Adjunct Faculty, Arizona State University
2008 - 2010	Course Coordinator and Lecturer, University of Amsterdam
	for the Master of Science program in Brain and Cognitive Sciences

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GRANTS & FELLOWSHIPS

2019 - 2022	US Air Force Grant ($147,000)
	Minimal models of sensory prediction, with S. Marzen & J. Lefeber
2018	Interacting Minds Centre Seed Funding Grant ($10,000)
2014 - 2018	Omidyar Fellowship ($225,000)

AWARDS & HONORS

2010 - 2013	Scottish Overseas Research Student Award (£22,100)
2010 - 2013	College of Humanities and Social Science Scholarship (£47,520)
2010 - 2013	Principal's Career Development Scholarship (declined) (£55,750)

2013	Agent-based Models of Creativity Travel Award (€1000)
2012	Evolang Student Support Travel Award (¥60,000)
2012	Complex Systems Summer School Travel Award ($1000)
2008	HSP Huygens Scholarship (€10,800)
2007	Amsterdam Merit Scholarship (€6000)
2003	AMR Scholarship in Arabic Classical Music ($1000)
2000 - 2003	HOPE Scholarship ($16,886)
1999	Durfee Foundation Research Assistantship in Archaeology ($3000)
1998	Georgia Governor's Honors Program in Biology
1997	Third place in Georgia State Science fair, Microbiology
1996	First place in Georgia State Science fair, Microbiology

PUBLICATIONS

Peer-reviewed Journal Articles

Kashima, Y., Perfors, A., **Ferdinand, V**., and Pattenden, E. (in press). Ideology, Communication, and Polarisation. *Philosophical Transactions of the Royal Society B: Biological Sciences*.

Uppal, A., **Ferdinand, V**., and Marzen, S. (2020). Inferring an Observer's Prediction Strategy in Sequence Learning Experiments. *Entropy,* 22(8), 896.

Ferdinand, V., Kirby, S., & Smith, K. (2019). The cognitive roots of regularization in language. *Cognition*, 184, 53-68.

Hobson, E.A., **Ferdinand, V.**, Kolchinsky, A., and Garland, J. (2019). Rethinking animal social complexity measures with the help of complex systems concepts. *Animal Behavior*, 155, 287-296.

Berdahl, A., Brelsford, C., De Bacco, C., Dumas, M., **Ferdinand, V.**, Grochow, J.A., Hébert-Dufresne, L., Kallus, Y., Kempes, C.P., Kolchinsky, A., Larremore, D.B., Libby, E., Power, E.A., Stern, C.A., and Tracey, B.D. (2019). Dynamics of beneficial epidemics. *Scientific Reports,* 9(1), 15093.

Peer-reviewed Published Proceedings

Ferdinand, V and Perfors, A. (2020). The evolution of category systems within and between learners. *Proceedings of the 42nd Annual Cognitive Science Society*.   [watch the talk]

Ferdinand, V. (2018). The coevolution of data and hypotheses in Bayesian cultural evolution. *Proceedings of the 12th International Evolution of Language Conference*.

Ferdinand, V. & Spike, M. (2016). Word learners regularize synonyms and homonyms similarly. *Proceedings of the 11th International Evolution of Language Conference*.

Ferdinand, V., Kirby, S., & Smith, K. (2014). Regularization in language evolution: on the joint contribution of domain-specific biases and domain-general frequency learning. *Proceedings of the 10th International Evolution of Language Conference*.

Ferdinand, V. & Thompson, B. (2014). Model fitting and prediction for language evolution. *Proceedings of the 10th International Evolution of Language Conference*.

Kamps, C., **Ferdinand, V.**, & Kirby, S. (2014). The origins of regularity in language: why coordination matters. *Proceedings of the 10th International Evolution of Language Conference*.

Ferdinand, V., Thompson, B., Kirby, S., & Smith, K. (2013). Regularization behavior in a non-linguistic domain. *Proceedings of the 35th Annual Cognitive Science Society*.

Beuls, K., **Ferdinand, V.**, & Kanwal, J. (2012). Self-organisation of a learnable language: What happens when an alien language replicates through human brains. *IEEE International Conference on Development and Learning and Epigenetic Robotics (ICDL)*.

Ferdinand, V., Kirby, S., & Smith, K. (2012). Searching for substance in the Baldwin Effect: when learning causally affects genetic adaptation. *Proceedings of the 9th International Evolution of Language Conference*.

Ferdinand, V. & Zuidema, W. (2009). Thomas' theorem meets Bayes rule: a model of the iterated learning of language. *Proceedings of the 31st Annual Cognitive Science Society*.

Invited Book Reviews

Ferdinand, V. (2018). A natural history of human morality by Michael Tomasello. *American Anthropologist*. 12 (1), 184-185.

Manuscripts

Berdahl, A., Bhat, U., **Ferdinand, V.**, Garland, J., Ghazi-Zahedi, K., Grana, J., Grochow, J.A., Hobson, E., Kallus, Y., Kempes, C.P. and Kolchinsky, A. (in prep). On the records.

Ferdinand, V. & Zuidema, W. (2008). An experiment in iterated function learning. *ILLC Preprint Series* (PP-2008-53), University of Amsterdam.

Ferdinand, V. & Zuidema, W. (2008). Language adapting to the brain: a study of a Bayesian iterated learning model. *ILLC Preprint Series* (PP-2008-54), University of Amsterdam.

In preparation

Ferdinand, V., Kemp, C., & Perfors, A. (in prep). Frequency effects on the evolution of category systems.

Ferdinand, V. (in prep). Measuring cultural inheritance using information flow through cognitive systems.

Ferdinand, V. (in prep). How selection and directed mutation guide the cultural evolution of digital images.

Ferdinand, V. (in prep). The fitness of ideas.

Ferdinand, V. (in prep). Multi-level selection in the evolution of culture.

Ferdinand, V. (in prep). Applied linear algebra for cultural evolution. (interactive online resource)

INVITED TALKS

Ferdinand, V. (October, 2018). How cognition drives cultural evolution. *Symposium on the Science of Stories.* The University of Vermont Complex Systems Center, Burlington, Vermont, USA.

Ferdinand, V. (May 2018). Cultural Evolution. *SITE Santa Fe public lecture series.* Santa Fe, New Mexico, USA.

Ferdinand, V. (March 2018). Using cognitive science to expose cultural evolution's empirical fitness landscapes. *Interacting Minds Center.* University of Aarhus, Denmark.

Ferdinand, V. (March 2018). On the cultural evolution of private and public replicators. *Center for Language Evolution.* University of Edinburgh, Scotland.

Ferdinand, V. (February 2018). On the cultural evolution of public and private replicators. *Ecologies of Creativity in Cultural Evolution Workshop.* Sønderborg, Denmark.

Ferdinand, V. (December 2017). The cognitive science of cultural evolution. *Computational Social Science Workshop.* Melbourne, Australia.

Ferdinand, V. & Kolchinsky, A. (November 2017). An overview of complexity science at the Santa Fe Institute. *Department of Earth and Environmental Sciences.* Seoul National University. Seoul, South Korea.

Ferdinand, V. (April 2017). Cultural evolution of digital art: how transformation and selection affect image complexity. *Interacting Minds Center.* University of Aarhus, Denmark.

Ferdinand, V. (October 2017). Charting cultural evolution's empirical fitness landscapes (in an ATV build by cognitive scientists). *School of Human Evolution and Social Change.* Tempe, Arizona, USA.

Ferdinand, V. (December 2017). Charting cultural evolution's empirical fitness landscapes (in an ATV build by cognitive scientists). *Australian National University.* Canberra, Australia.

Ferdinand, V. (August 2015). Accessing natural data on fast and recent language change. *Databases in Historical Linguistics Workshop.* Santa Fe Institute, New Mexico, USA.

Ferdinand, V. (March 2013). How we lose cultural variation via learning: modelling regularization, probability matching, and drift. *Computational Cognitive Science Lab.* University of California Berkeley, USA.

Ferdinand, V. (March 2013). Regularization behavior in a non-linguistic domain. Center for Research in Language. University of California San Diego, USA.

Ferdinand, V. (September 2012). The impact of probability matching on cultural evolution. *Artificial Intelligence Lab.* Vrjie Universiteit Brussel, Belgium.

Ferdinand, V. (June 2011). Discriminating between drift and selection in language evolution. *Centre for the Coevolution of Biology and Culture.* Durham University, England.

CONFERENCES & WORKSHOPS ORGANIZED

2018 & 2019	Cumulative Cultural Evolution. Santa Fe Institute, Santa Fe, USA.
2018	Cultural Evolution Conference. Tempe, Arizona, USA.
2018	Thermodynamics, Evolution, and Inference through the lens of Information Theory. Seoul National University, South Korea.

WORKSHOP PARTICIPATION

2018	Meaning of Information
2018	Computational Social Science Workshop
2018	Ecologies of Creativity in Cultural Evolution Workshop
2017	National Science Foundation Workshop on Multidisciplinary Complex Systems (co-wrote Nervous Systems and Behavior briefing)
2016, 2017	72 Hours of Science
2015	Databases in Historical Linguistics Workshop
2013	International Summer School in Agent-based Models of Creativity
2012	Complex Systems Summer School

CONFERENCE TALKS

Ferdinand, V and Perfors, A. (2020). The evolution of category systems within and between learners. *Proceedings of the 42nd Annual Cognitive Science Society.* [watch the talk]

Ferdinand, V. (February 2019). The coevolution of ideas and artifacts: an inference-based model of cultural evolution. *The Australasian Mathematical Psychology Conference.* Melbourne, Australia.

Ferdinand, V. (October 2018). Evolution and inference: how cognitive biases can be selection pressures on culture. *2nd Conference of the Cultural Evolution Society.* Tempe, Arizona, USA.

Oduniyi, E., & **Ferdinand, V.** (October 2018). Comparing sentiment analysis and physiological tools for emotion extraction in stories. *2nd Conference of the Cultural Evolution Society.* Tempe, Arizona, USA.

Ferdinand, V. (April 2018). On the coevolution of data and hypotheses in Bayesian cultural evolution. *12th International Evolution of Language Conference.* Torún, Poland.

Ferdinand, V. (September 2017). Combining transformative and selective cultural evolution to understand the evolution of digital art. *1st Conference of the Cultural Evolution Society.* Jena, Germany.

Ferdinand, V. & Spike, M. (March 2016). Word learners regularize synonyms and homonyms similarly. *11th International Evolution of Language Conference.* New Orleans, Louisiana, USA.

Ferdinand, V. (March 2015). A cognitive basis for cultural drift. *European Human Behaviour and Evolution Association Conference.* Helsinki, Finland.

Ferdinand, V., Kirby, S. & Smith, K. (April 2014). Regularization in language evolution: on the joint contribution of domain-specific biases and domain-general frequency learning. *10th International Evolution of Language Conference.* Vienna, Austria.

Ferdinand, V., Kamps, C., & Kirby, S. (April 2014). The origins of regularity in language: why coordination matters. *10th International Evolution of Language Conference.* Vienna, Austria.

Ferdinand, V., Kirby, S. & Smith, K. (August 2013). Regularization behavior in a non-linguistic domain. *35th Annual meeting of the Cognitive Science Society.* Berlin, Germany.

Ferdinand, V. (May 2012). Mapping out the cultural evolutionary dynamics of probability matching behavior. *Linguistics and English Language Postgraduate Conference.* Edinburgh, Scotland.

CONFERENCE POSTERS

Ferdinand, V. (July 2019). The impact of frequency on the evolution of category systems. *41st Annual Cognitive Science Society Conference.* Montreal, Canada.

Semenzin, C., **Ferdinand, V.**, Kirby, S. (July 2019). Learning and Production in the Explanation of Regularization Behaviour: a Computational Model. *41st Annual Cognitive Science Society Conference.* Montreal, Canada.

Ferdinand, V. (July, 2017). Probability matching as a cognitive basis for cultural drift. *39th Annual Cognitive Science Society Conference.* London, England.

Ferdinand, V. & Thompson, B. (April 2014). Model fitting and prediction for language evolution. *10th International Evolution of Language Conference.* Vienna, Austria.

Ferdinand, V. (September 2013). Why learners eliminate variation in language. *International Summer School in Agent-based Models of Creativity.* Cortona, Italy.

Ferdinand, V. (May 2013). How we lose cultural variation via learning: an example of regularization during frequency learning in two domains. *Language at Edinburgh Lunch*. Edinburgh, Scotland.

Ferdinand, V. & Thompson, B. (March 2013). How we lose cultural variation via learning: an example of regularization during frequency learning in two domains. *European Human Behaviour and Evolution Association Conference*. Amsterdam, Netherlands.

Beuls, K., Ferdinand, V. & Kanwal, J. (November 2012). Self-organization of a learnable language: what happens when an alien language replicates through human brains. *IEEE International Conference on Epigenetic Robotics*. San Diego, California, USA.

Ferdinand, V. (March 2012). Mapping out the cultural evolutionary dynamics of probability matching behavior. *European Human Behaviour and Evolution Association Conference*. Durham, England.

Ferdinand, V., Kirby, S., & Smith, K. (March 2012). Searching for substance in the Baldwin Effect: when learning causally affects genetic adaptation. *9th International Evolution of Language Conference*. Kyoto, Japan.

Ferdinand, V. & Zuidema, J. (August 2009). Thomas' theorem meets Bayes rule: a model of the iterated learning of language. *31st Annual Cognitive Science Society Conference*. Amsterdam, Netherlands.

DEPARTMENTAL TALKS

Santa Fe Institute
Information flow through cognitive systems & transmission fidelity in cultural inheritance (July 2018)
Cultural evolution (May 2018)
The coevolution of ideas and material culture: a sweet mathematical model (May 2018)
What replicates in cultural evolution? (July 2017)
Two levels of selection in cultural evolution (February 2017)
Research overview to SFI's Science Board (April 2016)
Research overview to SFI's Business Action Network (November 2015)
Cognition, compression, and cultural evolution (August 2015)

Centre for Language Evolution, University of Edinburgh
Inductive evolution: cognition, culture, and regularity in language (December 2014)
What drives regularity in language? (May 2014)
How we lose variation through learning: on the domain generality of linguistic regularization biases (January 15, 2013)
Frequency-dependent copying and cultural drift (October 2012)
Towards a general framework for cultural evolution (February 2011)

EXHIBITIONS

In collaboration with artist Stephen Auger. (June 2018). IRIS Phosphenes chamber. *Interplanetary Festival*. Santa Fe, New Mexico, USA.

Ferdinand, V. (March 2016). Hallucinating structure and how we regularize timeseries data. *11th International Evolution of Language Conference*. New Orleans, Louisiana, USA.

TEACHING EXPERIENCE

University of Melbourne
Complex Human Data Hub Summer School:
How to program and run largescale online experiments (2018, 2019)

Santa Fe Institute
Implicit bias workshop (2016, 2017, 2018)
Programming in Python (2017)
Principles of modeling and model fitting (2017)

University of Edinburgh
Introduction to Psychology, TA (2013)
Linear mixed effects models workshop (2016)
Programming and running online experiments workshop (2011, 2012, 2013)

University of Amsterdam
Current Issues in Cognitive Science, co-lecturer and coordinator (2009, 2010)
Scientific Writing and Presenting Skills, TA (2007, 2008, 2009, 2010)
Argumentation and Presenting Skills, Coordinator (2010)
Cognition and Communication, TA (2008, 2009)

Centre for Language and Culture, Marrakech
English Language (2004, 2005)

University of Georgia
Middle Eastern Music (2003)

SUPERVISION & MENTORING EXPERIENCE

2020	Supervised honors thesis of Jacob Kuek, University of Melbourne
2018	Mentored high school student Alec Lee, Santa Fe Indian School
2017	Supervised undergraduate REU project of Erick Oduniyi, Santa Fe Institute
2017	Supervised undergraduate REU project of Brooke Taylor, Santa Fe Institute
2017	Mentored high school student Isabelle Mauboussin, Santa Fe Institute

2017	Mentored high school student Claire Miller, Santa Fe Institute
2016	Mentored high school student Sevar Vesselinova, Santa Fe Institute
2015 - 2016	Supervised honors thesis of Chiara Semezin, University of Edinburgh
2014 - 2015	Supervised master thesis of Caroline Kamps, University of Edinburgh

RESEARCH EXPERIENCE

| 2018 | Field biologist for Tambopata Macaw Project |
| | Tambopata National Reserve, Peru |

| 2013 | Research training in Information Theory with Simon DeDeo |
| | Santa Fe Institute, Santa Fe, USA |

| 2013 | Research training in Bayesian modelling with Tom Griffiths |
| | University of California, Berkeley, USA |

| 2010 | Research assistant to Rens Bod, Institute for Language, Logic, and Computation, University of Amsterdam, Netherlands |

| 2009 | Research internship at Fair Food International, Amsterdam, Netherlands |

| 1999 | Field assistant in archaeology at Homolovi State Park, Arizona, USA |

SERVICE TO PROFESSION

Reviewer for journals
Nature Communications, Adaptive Behavior, Journal of Child Language, Perception, PLOS1, SAGE open

Reviewer for conference proceedings
Cognitive Science Conference, Evolution of Language Conference

Scientific committee member
Applications in Cultural Evolution: Arts, Languages, Technologies

PROFESSIONAL MEMBERSHIPS

Cultural Evolution Society (founding member)
Cognitive Science Society
Human Behavior and Evolution Society

DEPARTMENTAL SERVICE

2019 - present	Member of two PhD committees, University of Melbourne
2018	Chair of Colloquium Committee, Santa Fe Institute
2015 - 2018	Sat on four Omidyar Fellow hiring committees, Santa Fe Institute

COMMUNITY OUTREACH

2018	Established a high school internship program between the Santa Fe Indian School and the Santa Fe Institute
2018	Panelist at the Interplanetary Festival, Santa Fe, NM
2018	Public lecture on Cultural Evolution at the art gallery SITE Santa Fe
2018	Public lecture on Cultural Evolution to a group of science writers
2016	Created an Implicit Bias Workshop for students at the Santa Fe Institute
2017	Interviewed on Green Chile Science Podcast
2017	Ran data science clinics for high school students at Santa Fe Indian School
2017	Lead food web game for 60 2nd-graders, Roots Farm in Tijeras, NM
2017	Gave plenary for Santa Fe Institute's high school award ceremony "What it means to be a scientist"
2017	Volunteer Science Fair Judge, Santa Fe Alliance for Science
2008	Producer of Radio Cognito, a cognitive science radio program on Radio Patapoe, Amsterdam

LANGUAGES & TECHNICAL SKILLS

English (native), Spanish, Dutch, Moroccan Arabic
R (native), python, bash, Javascript, html, css

I program experiments as large-scale gamified apps using Google Cloud Platform's App Engine and Datastore. Javascript front end, python back end, P5js for interactive animation.

Participant recruitment and management via Amazon's crowd sourcing platform Mechanical Turk.

Ethics applications writing for experiments with human subjects. Grant writing. Survey design.

Statistical analysis of big data. Mixed effects linear models. Model fitting. Causality analysis. Information theory. Complex systems science.

Public speaking and science communication.

Woodworking and ceramics.

REFERENCES

Robert Boyd
Professor, School of Human Evolution and Social Change, University of Arizona
Robert.Boyd.1@asu.edu, +1 310 909 3156

Daniel Dennett
Co-Director of Center for Cognitive Studies, Tufts University
daniel.dennett@tufts.edu, +1 617 627 3297

Mirta Galesic
Cowan Chair in Human Social Dynamics, Santa Fe Institute
galesic@santafe.edu, +1 505.946.2703

Tom Griffiths
Henry R. Luce Professor of Information Technology, Consciousness and Culture
tomg@princeton.edu, +1 609-258-4442

Simon Kirby
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Andrew Perfors
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