



Individual variation, network heterogeneity and linguistic complexity: which way does the relationship go?

Sébastien Lérique, Dan Dediu, Mårton Karsai, Jean-Philippe Magué

► To cite this version:

Sébastien Lérique, Dan Dediu, Mårton Karsai, Jean-Philippe Magué. Individual variation, network heterogeneity and linguistic complexity: which way does the relationship go?. Interaction and the Evolution of Linguistic Complexity, Jun 2019, Edinburgh, United Kingdom. hal-03900506

HAL Id: hal-03900506

<https://hal.science/hal-03900506>

Submitted on 16 Dec 2022

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Individual variation, network heterogeneity
and linguistic complexity:
which way does the relationship go?

Sébastien Lericque, Dan Dediu, Márton Karsai,
& Jean-Philippe Magué

The pr

Language must adapt to many

... in a comp

network heterogeneity
c complexity:
ne relationship go?

n Dediu, Márton Karsai,
ppe Magué

The problem

Language must adapt to many

- ≠ landscapes
- ≠ situations
- ≠ sub-communities
- ≠ material conditions
- ≠ idiosyncracies

... in a complex network

Possible mechanisms

Lowest common denominator

“Train window” communication → rudimentary signs

Advertisements → pre-filtered interpretations

Administrative language → “syntax of abridgement” Marcuse 1964

Portable partial acts Di Paolo *et al.* 2018

Possible m

Super redund
com

Repairing breakdowns
Articulating something
Meaning something
Negotiating turns & interaction

Redundancy turns into cor

mechanisms
on denominator

rudimentary signs
interpretations
of abridgement” Marcuse 1964

2018

Possible mechanisms

Super redundant-robust- complex

Repairing breakdowns Articulating something Meaning something Negotiating turns & interaction	can each be done in many ways
--	-------------------------------

+

Redundancy turns into complexity when not needed

Hypot

Standing variation in all aspects of
Network heterogeneity → [pressu](#)
Interactional disorder Di Paolo et al.

Are core factors gen
robustness &

mechanisms

redundant-robust-
complex

can each be done in many ways

+

complexity when not needed

Hypothesis

Standing variation in all aspects of language → **fuel for redundancy**

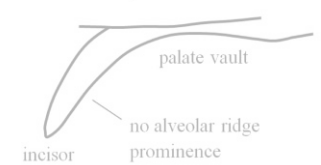
Network heterogeneity → **pressure for adaptation**

Interactional disorder Di Paolo *et al.* 2018

Are core factors generating redundancy,
robustness & complexity

Exam

(a) !Xóõ speaker



(b) Author



Chronic *otitis media* in Australian
Aboriginal populations Butcher 2013

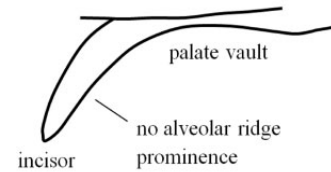
More diversity than expected Evans

Japanese business-card exchange ru

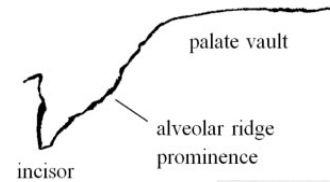
Inspirations

Examples

(a) !Xóõ speaker



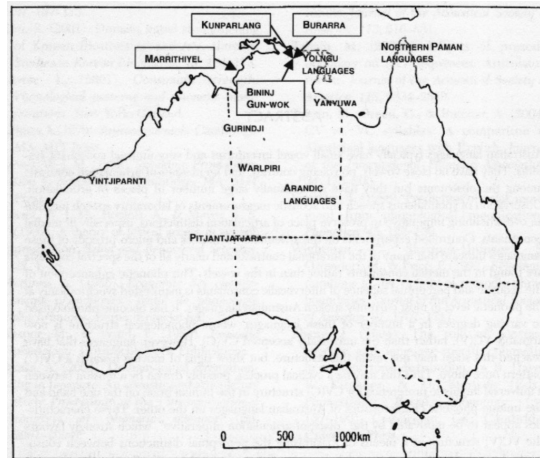
(b) Author



Vocal tract anatomy and articulation

Moisik & Dediu 2017

Chronic *otitis media* in Australian Aboriginal populations Butcher 2013



More diversity than expected Evans & Levinson 2009

Japanese business-card exchange rules Cuffari *et al.* 2015

Inspirations

Evolutionary biology

Niche construction → speakers construct their environment

Developmental plasticity → learners adapt to their context

Evolution of development → more constraints and opportunities

Adaptation to different environments is dealt with dynamic,
recursive and complex processes

Inspira

Population struc

Minor changes in a population

Granovetter 1978

ations

ary biology

construct their environment
ners adapt to their context
ore constraints and opportunities

nments is dealt with dynamic,
mplex processes

Inspirations

Population structure & variation

Minor changes in a population can have macroscopic effects

Granovetter 1978

Bikhchandani *et al.* 1992

Inspira

Network spread

Watts



Generate

Structure

$n = 25$



$p = 0.12$
 $\langle z \rangle = 3$



Seed 0

Thresholds

Dirac Normal

$\text{loc} = 0.18$



Seed 0



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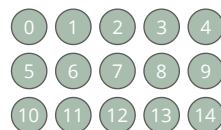
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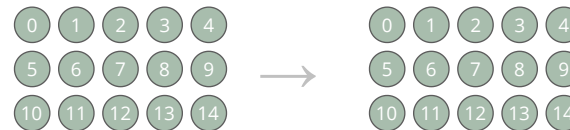
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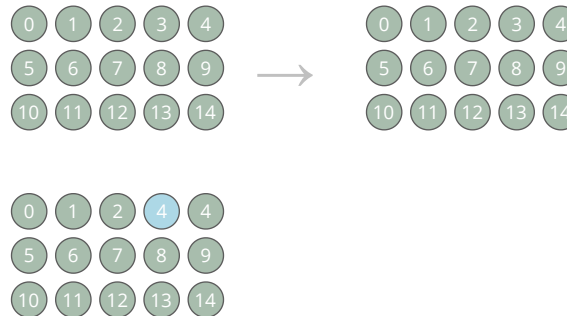
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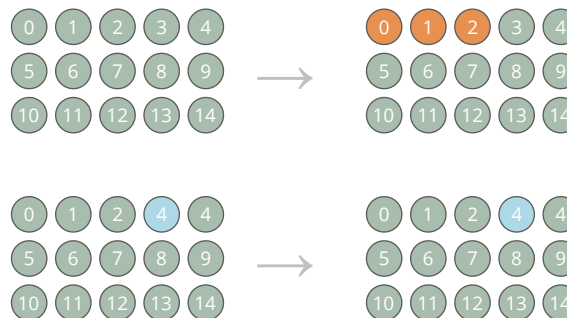
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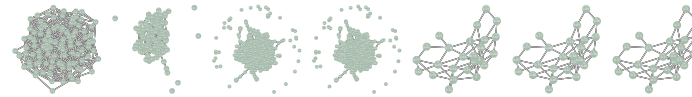
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Inspirations

Network spreading processes

Watts 2002



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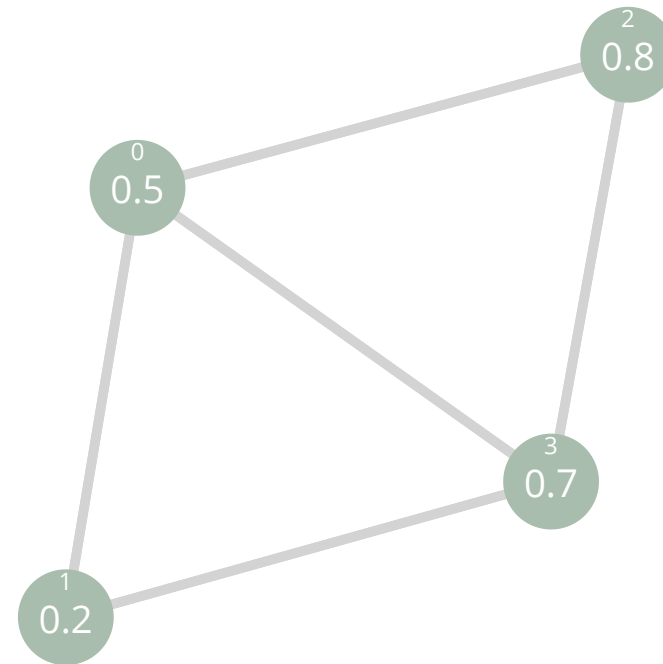
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Seed

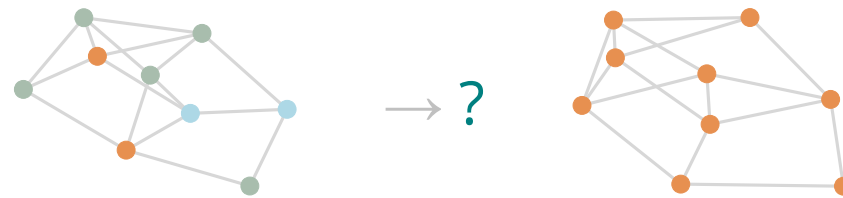


save



Projects

Simulations



When competing, how many nodes/edges
are necessary for global adoption?

What are the effects of

- node diversity
- network topology
- placement of seed nodes or constrained edges

Proj

Experi

One-way communication

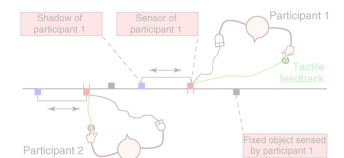
~ Iterated Learning

Interactive communication

~ Experimental Semiotics

Minimal interactive coupling

~ Perceptual crossing



De Jaegher *et al.* 2010 [CC-BY]

Projects

Experiments

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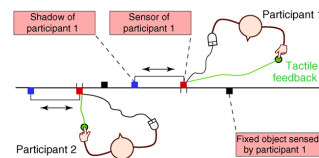
~ Perceptual crossing

playing with

Network topology

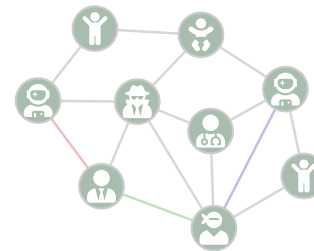
Edge constraints

Individual sensitivities



De Jaegher *et al.* 2010

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Possibly Twitter

25% GMT+0/1

tweets in French

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Interactional disorder © Paolo et al. 2018

Are core factors generating redundancy, robustness & complexity

Examples

Mr. Tobi's speaker → John's user → Vocal tract anatomy and articulation Moskuk & Dediu 2017

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Minimal interactive coupling → Perceptual crossing

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- Edge constraints
- Individual sensitivities

Possibly Twitter

2016-04-01-2017-01-01

tweets in French

Da Jaeger et al. 2010