Corpus-based evidence for a cognitive mechanism underlying lexical replacement

Dr. Martin Schweinberger
slides available at
www.martinschweinberger.de
m.schweinberger@uq.edu.au
R code upon request

The University
Of Queensland
Australia

Phenomenon: Adjective Amplification

(1) And you just have to hint well then it's a very good hint (ICE-AUS:S1A-012$A)

(2) They're all really cheap <#> They're all really nice, the t-shirts in there (ICE-AUS:S1A-009$B)

(3) It was so bad (ICE-AUS:S1A-044$B)

Intensification

Related to the semantic category of *degree* (degree adverbs) and ranges from low (downtoning) to high (amplifiers)

(Quirk et al. 1985: 589–590)

- Amplifiers
  - Boosters, e.g. *very*
  - Maximizers, e.g. *completely*
- Downtoners
  - Approximators, e.g. *almost*
  - Compromisers, e.g. *more or less*
  - Diminishers, e.g. *partly*
  - Minimizers, e.g. *hardly*

very vs. *really*: no meaning change → interchangeable, *very* vs. *hardly*: meaning change → not interchangeable

Motivation

Amplification

- major area of gramm. change (cf. Brinton and Arnovick 2006: 441)
- crucial for "social and emotional expression of speakers" (Ito and Tagliamonte 2003: 258)
- linguistic subsystem which allows precise circumscription of a variable context (Labov 1972, 1966: 49)
- ideal case for testing mechanisms underlying language change!

Previous Research

Amplification

- substantial amount of corpus-based research on intensification (e.g Aijmer 2011, 2018; Fuchs 2016, 2017; Núñez Pertejo and Palacios 2014; Palacios and Núñez Pertejo 2012)
  → but mostly either focused on individual intensifiers or without regard to the intensified adjectives
- associated with teenage talk and young(ish) (female) speakers
  (Bauer and Bauer 2002; D'Arcy 2015; Macaulay 2006; Tagliamonte 2006, 2008)
- recently amplifier-adjective bigrams have come more into focus (e.g. Schweinberger 2017; Wagner 2017a,b)

Focus

- Amplifying *really* replaces *very* (lexical replacement)

  (see D'Arcy (2015) for NZE; see Ito and Tagliamonte (2003) and Barnfield and Buchstaller (2010) for North East British English, Tagliamonte (2008) and Tagliamonte and Denis (2014) for Toronto English; see Tagliamonte and Denis (2014) for South Eastern Ontario English)

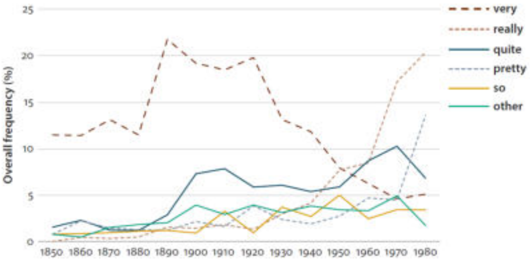


Figure 1: Adapted from D'Arcy (2015: 468)

Research Question

Q

Why is *very* replaced by *really* and not by any other variant (e.g. *so*, *quite*, *pretty*)?

→ What mechanisms underlie lexical replacement?

Scenario 1 (Broadening)

Really associate with many (but infrequent) adj. types

(Mair 2004: "delayed increase of discourse frequency" hypothesis)

Argument

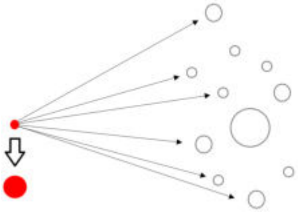
→ co-occurrence with many different adj. types

→ frequent use

→ deeper cognitive entrenchment

→ easier retrieval from memory

→ dominance within the amplifier system.



Prediction

Co-occurrence with many different adjective types

→ high lexical diversity

→ weak coll. attraction with specific adj. types

Scenario 2 (Specialization)

Really associate with few but frequent adj. types (HFAs)

(Lorenz 2002: 144; Méndez-Naya 2003: 375; Tagliamonte and Roberts 2005: 285)

Argument

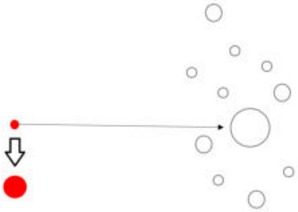
→ co-occurrence with high-freq. adj. types

→ frequent use

→ deeper cognitive entrenchment

→ easier retrieval from memory

→ dominance within the amplifier system.



Prediction

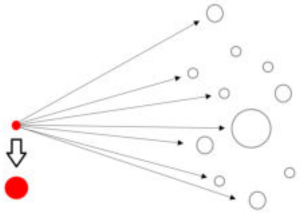
Co-occurrence with few high frequency adjectives

→ low lexical diversity

→ strong coll. attraction with high-freq. adj. types

Scenario 3 (Randomness)

Really associate with random adj. types
$\rightarrow$ We cannot predict which variants become successful based on their coll. profile.



Hypothesis

H_1

If *really* is successful because of specialization on HFAs

→ sig. pos. correlation with adjective frequency

If broadening → neg. correlation with adj. freq.
If random → no correlation with adj. freq.

Data and Methodology

Corpus data: International Corpus of English (ICE)

- Australian, British, Canadian, Irish, and New Zealand ICE components
- Shared design (allows meaningful comparisons between varieties of English)
- One million words (600,000 spoken and 400,000 written) from diverse spoken and written text types (cf. next slide) with each file containing app. 2,000 words.
- Accompanied by metadata and biodata of speaker (extremely interesting resource for variationist analyses)

Corpus data: International Corpus of English (ICE)

Mode	Conversation type	Register	Text type	Number of text files
SPOKEN (300)	Dialogues (180)	Private (100)	Face-to-face conversations	90
			Phonecalls	10
		Public (80)	Classroom Lessons	20
			Broadcast Discussions	20
			Broadcast Interviews	10
			Parliamentary Debates	10
			Legal cross-examinations	10
			Business Transactions	10
	Monologues (120)	Unscripted (70)	Spontaneous commentaries	20
			Unscripted Speeches	30
			Demonstrations	10
			Legal Presentations	10
		Scripted (50)	Broadcast News	20
			Broadcast Talks	20
			Non-broadcast Talks	10

Data Processing

- Spoken private dialogue section of each component
- Part–of-speech tagged (OpenNLP vis R) the
- Retrieved adjectives (PoS–tag JJ)
- Determined whether adjective were preceded by an amplifier (member of a predefined set of amplifiers)
- Sentiment Analysis of adjective types (Jockers 2017)

Data Processing

- Determined if the same amplifier type had occurred within a span of three adjective slots previously ($\rightarrow$ priming)
- Token freq. of adjective type by age group (Tagliamonte and Roberts 2005)
- Removed...
  - negated adjectives
  - comparative and superlative forms
  - adjectives that were not amplified by at least two different amplifier types
  - adjectives that were preceded by downtoners
  - strange forms (e.g. *much*)

Data Processing

- Semantic classification of adjective (simplified version of Dixon (1977), cf. also D'Arcy (2015); Tagliamonte and Roberts (2005); Tagliamonte (2006, 2008))
- Manual cross–evaluation of automated classification
- Metadata and speaker information

Variable Coding

Dependent Variable(s)

really	nominal	yes/no occurrence of pre-adjectival *really*

Independent Variable(s)

Age	ordinal	min. young | middle-aged | old	extra	linguistic
AudienceSize	nominal	Dyad | MultipleInterlocutors		
ConversationType	nominal	MixedSex | SameSex		
Gender	nominal	Female | Male		
(Education)	nominal	College | NoCollege		
Priming	nominal	prime | noprime		
Emotionality	categorical	negative | nonemotional | positive	intra	linguistic
Function	nominal	attributive | predicative		
SemanticCategory	categorical	semantic category of adj.		
Gradability	nominal	gradable | nongradable		
Adjective	categorical	bad | funny | good | interesting | nice | other		
Frequency	numeric	Frequency of adj. by age group		

Mixed-Effects Binomial Logistic Regression

(Baayen 2008; Faraway 2016)

What is MEBLoR?

- Standard models for multivariate analyses
- Can handle nested/grouped data structure
- Easy multicollinearity detection

Problems of MEBLoR

- Cannot handle small data sets (well)
- Extremely high β-error rate
  - if sig. effect: ✓
  - if no sig. effect: ???

Mixed-Effects Binomial Logistic Regression

(Baayen 2008; Faraway 2016)

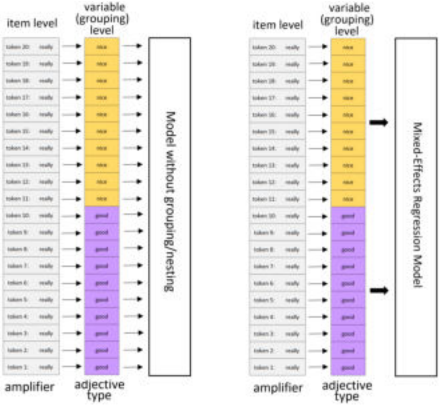


Figure 2: Difference between models without grouping/nesting and mixed-effects models (with grouping/nesting).

Boruta Analysis

(Kursa et al. 2010)

What is Boruta?

- Alternative to regressions that can handle small data sets
- Variable selection procedure
- Extension/improvement of random forests
- Hundreds of forests are grown → distribution of parameters rather than singe values (higher reliability)

Problems of Boruta

- Ignores multicollinearity(!)
- Does not model nested/grouped data structure

Boruta Analysis

(Kursa et al. 2010)

Procedure

1. Addition randomness: shuffling copies of all features (shadow features).
2. Training of a random forest classifier on the extended data
3. Application of a feature importance measure (Mean Decrease Accuracy)
4. Checking whether a real feature has a higher importance than the best shadow features at each iteration
5. Continuous removal of unimportant features (features that are less important than shadow features)

Results

Results AusE: Observed, MEBLoR, and Boruta

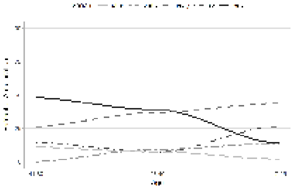


Figure 3: % Variants in AusE.

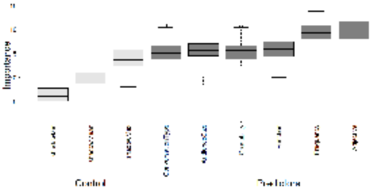


Figure 4: Boruta results for really in AusE.

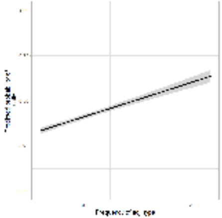


Figure 5: Prob. really in AusE by adj. freq.

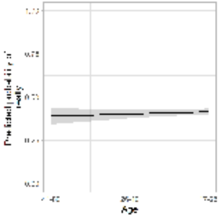


Figure 6: Prob. really in AusE across age.

Summary AusE Results

	Boruta		
Variety	**Age**	**Frequency**	**H_1?**
AusE	✗	✓	✓

Results BrE: Observed, MEBLoR, and Boruta

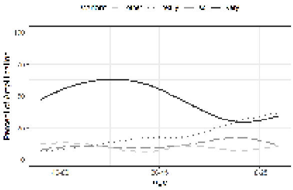


Figure 7: % Variants in BrE.

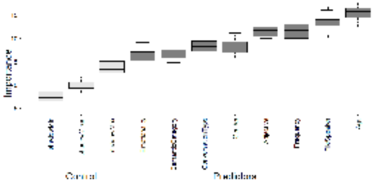


Figure 8: Boruta results for really in BrE.

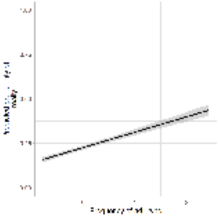


Figure 9: Prob. really in BrE by adj. freq.

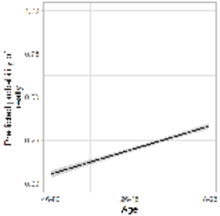


Figure 10: Prob. really in BrE across age.

Summary BrE Results

	Boruta		
Variety	**Age**	**Frequency**	**H_1?**
AusE	✗	✓	✓
BrE	✓	✓	✓

Results CanE: Observed, MEBLoR, and Boruta

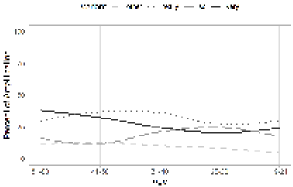


Figure 11: % Variants in CanE.

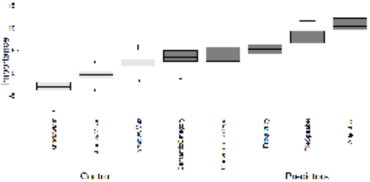


Figure 12: Boruta results for really in CanE.

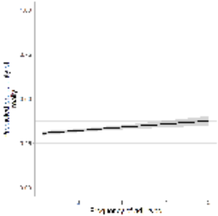


Figure 13: Prob. really in CanE by adj. freq.

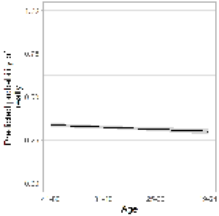


Figure 14: Prob. really in CanE across age.

Summary CanE Results

	Boruta		
Variety	**Age**	**Frequency**	**H_1?**
AusE	✗	✓	✓
BrE	✓	✓	✓
CanE	✗	✓	✓

Results IrE: Observed, MEBLoR, and Boruta

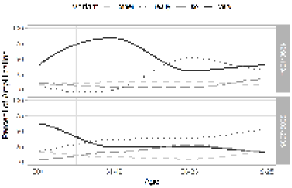


Figure 15: % Variants in IrE.

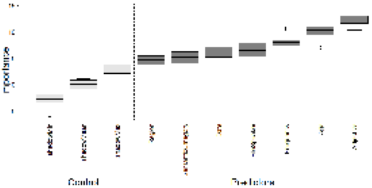


Figure 16: Boruta results for really in IrE.

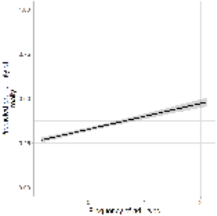


Figure 17: Prob. really in IrE by adj. freq.

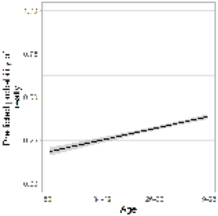


Figure 18: Prob. really in IrE across age.

Summary IrE Results

	Boruta		
Variety	**Age**	**Frequency**	**H_1?**
AusE	✗	✓	✓
BrE	✓	✓	✓
CanE	✗	✓	✓
IrE	✓	✓	✓

Results NZE: Observed, MEBLoR, and Boruta

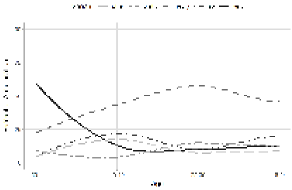


Figure 19: % Variants in NZE.

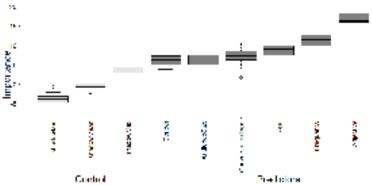


Figure 20: Boruta results for really in NZE.

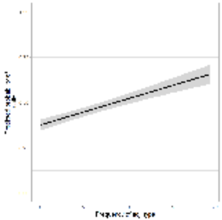


Figure 21: Prob. really in NZE by adj. freq.

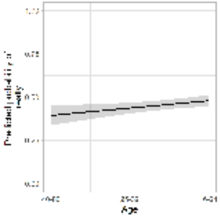


Figure 22: Prob. really in NZE across age.

Summary NZE Results

	Boruta		
Variety	**Age**	**Frequency**	**H_1?**
AusE	✗	✓	✓
BrE	✓	✓	✓
CanE	✗	✓	✓
IrE	✓	✓	✓
NZE	✓	✓	✓

Summary NZE Results

	Boruta		
Variety	**Age**	**Frequency**	**H_1?**
AusE	✗	✓	✓
BrE	✓	✓	✓
CanE	✗	✓	✓
IrE	✓	✓	✓
NZE	✓	✓	✓

Discussion & Outlook

Summary

The analysis ...

- confirms that *really* correlates with adj. freq.
  (positive correlation between the use of *really* and adjective frequency)
- suggests that lexical replacement is accompanied by (functional) re-organization in addition to diffusion through the speech community (absence of age effects)
  (see D'Arcy 2015)
- shows that complementing mixed-modeling with Boruta is useful to avoid overlooking significant effects
  (avoidance of β-errors)

Discussion

- *Really* successfully replaced the dominant form *very* because it collocated with HFAs.
- No signs that *really* of broadening before taking over the system.
- Broadening once dominant (substantiates Tagliamonte and Denis 2014)

Argument

1. The co-occurrence with HFAs lead to the innovative variant being used as a more expressive variant to amplify certain HFAs.
2. The frequency of the innovative form increased because it piggybacked on the frequency of the HFA.
3. Increase in use $\rightarrow$ more deeply entrenched.
4. Deeper entrenchment $\rightarrow$ increased ease of retrieval.
5. Higher ease of retrieval $\rightarrow$ advantage over rival variants.
6. Innovative variant broadens because it increasingly co-occurs with more adj. types.

Outlook

Could this be a universal mechanism?

Test if the mechanisms...

- can be shown to have worked in analogous changes in English
  3^{rd} p. sg. ind. morpheme: <eth> → <(e)s>
- can be shown to have worked in analogous changes in languages other than English

Thank you so, really, very much!

Acknowledgements

I would like to thank...

all ICE teams(!), in particular, Pam Peters and Adam Smith
for providing me with a preliminary version of ICE-Aus
(without them the current study would not have been possible)

my colleagues at UQ

for comments and their feedback on earlier versions of this talk

Aijmer, K. (2011). Are you totally spy? a new intensifier in present-day american english. In S. Hancil (Ed.), *Marqueurs discursifs et subjectivité*, pp. 155–172. Rouen: Universités de Rouen and Havre.

Aijmer, K. (2018). That's well bad. some new intensifiers in spoken in british english. In V. Brezina, R. Love, and K. Aijmer (Eds.), *Corpus Approaches to Contemporary British English*, pp. 60–95. New York and London: Routledge.

Baayen, R. H. (2008). *Analyzing linguistic data. A practical introduction to statistics using R.* Cambridge: Cambridge University press.

Barnfield, K. and I. Buchstaller (2010). Intensifiers on tyneside - longitudinal developments and new trends. *English World-Wide 31*(3), 252–287.

Bauer, L. and W. Bauer (2002). Adjective boosters in the english of young new zealanders. *Journal of English Linguistics 30*, 244–257.

Brinton, L. J. and L. K. Arnovick (2006). *The English Language: A Linguistic History*. Oxford: Oxford University Press.

D'Arcy, A. F. (2015). Stability, stasis and change - the longue duree of intensification. *Diachronica 32*(4), 449–493.

Dixon, R. M. W. (1977). Where have all the adjectives gone? *Studies in Language 1*, 19–80.

Faraway, J. J. (2016). *Extending the linear model with R: generalized linear, mixed effects and nonparametric regression models*, Volume 124. CRC Press.

Fuchs, R. (2016). Register variation in intensifier usage across asian englishes. In H. Pichler (Ed.), *Discourse-Pragmatic Variation and Change: Insights from English*, pp. 185–213. Cambridge: Cambridge University Press.

Fuchs, R. (2017). Do women (still) use more intensifiers than men? *International Journal of Corpus Linguistics 22*(3), 345–374.

Ito, R. and S. Tagliamonte (2003). Well weird, right dodgy, very strange, really cool: Layering and recycling in english intensifiers. *Language in Society 32*, 257–279.

Jockers, M. L. (2017). Syuzhet 1.0.4 now on cran. http://www.matthewjockers.net/2017/12/16/syuzhet-1-0-4/.

Kursa, M. B., W. R. Rudnicki, et al. (2010). Feature selection with the boruta package. *J Stat Softw 36*(11), 1–13.

Labov, W. (1966). *The Social Stratification of English in New York City*. Washington DC: Center for Applied Linguistics.

Labov, W. (1972). *Sociolinguistic patterns*. Philadelphia, PA: University of Pennsylvania Press.

Lorenz, G. (2002). Really worthwhile or not really significant? a corpus-based approach to the delexicalization and grammaticalization of intensifiers in modern english. In I. Wischer and G. Diewald (Eds.), *New Reflections on Grammaticalization*, pp. 143–161. Amsterdam: John Benjamins.

Macaulay, R. (2006). Pure grammaticalization: The development of a teenage intensifier. *Language Variation and Change 18*, 267–283.

Mair, C. (2004). Corpus linguistics and grammaticalisation theory. statistics, frequencies and beyond. In H. Lindquist and C. Mair (Eds.), *Corpus approaches to grammaticalization in English*, pp. 121–150. Amsterdam and Philadelphia: John Benjamins.

Méndez-Naya, B. (2003). On intensifiers and grammaticalization: The case of swithe. *English Studies 84*, 372–391.

Núñez Pertejo, P. and I. Palacios (2014). That's absolutely crap, totally rubbish. the use of intensifiers absolutely and totally in the spoken language of british adults and teenagers. *Functions of Language 21*(2), 210–237.

Palacios, I. and P. Núñez Pertejo (2012). He's absolutely massive. it's a super day. madonna, she is a wicked singer. youth language and intensification: A corpus-based study. *Text and Talk 32*(6), 773–796.

Quirk, R., S. Greenbaum, G. Leech, and J. Svartvik (1985). *A Comprehensive Grammar of the English Language*. London & New York: Longman.

Schweinberger, M. (2017). Using intensifier-adjective bi-grams to investigate mechanisms of change. Paper presented at ICAME38. Prague, 27/5/2017.

Tagliamonte, S. (2006). "so cool, right?": Canadian english entering the 21st century. *The Canadian Journal of Linguistics/La revue canadienne de linguistique 51*(2), 309–331.

Tagliamonte, S. (2008). So different and pretty cool! recycling intensifiers in toronto, canada. *English Language and Linguistics 12*(2), 361–394.

Tagliamonte, S. and C. Roberts (2005). So weird; so cool; so innovative: The use of intensifiers in the television series friends. *American Speech 80*(3), 280–300.

Tagliamonte, S. A. and D. Denis (2014). Expanding the transmission/diffusion dichotomy: Evidence from canada. *Language 90*(1), 90–136.

Wagner, S. (2017a). Amplifier-adjective 2-grams world-wide: focus on pretty. Paper presneted at ICAME 37. Charles University Prague, 27/5/2017.

Wagner, S. (2017b). Totally new and pretty awesome: Amplifier–adjective bigrams in glowbe. *Lingua 200*, 63–83.

Corpus-based evidence for a cognitive mechanism underlying lexical replacement

Dr. Martin Schweinberger
slides available at
www.martinschweinberger.de
m.schweinberger@uq.edu.au
R code upon request

The University
Of Queensland
Australia

Appendix

Results: GLMM and Boruta

	GLMM		Boruta		
Variety	**Age**	**Frequency**	**Age**	**Frequency**	**H_1?**
AusE	✗	✗	✗	✓	✓
BrE	✓	✗	✓	✓	✓
CanE	✗	✗	✗	✓	✓
IrE	✓	✗	✓	✓	✓
NZE	✓	✗	✓	✓	✓

Variationist Sociolinguistics

- Language is not homogeneous: variation is ubiquitous
  - Social factors : language use
  - Linguistic variation not random
  - Systematic correlation between certain social factors (age, gender, class, ethnicity, etc.) and language use
- Linguistic differentiation $\leftrightarrow$ social stratification

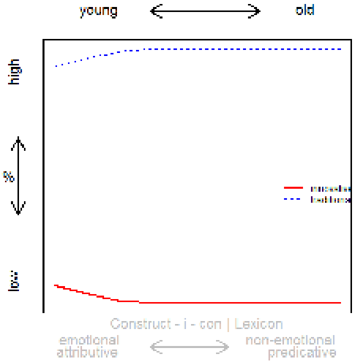
Diffusion of Innovations

young ⟷ old

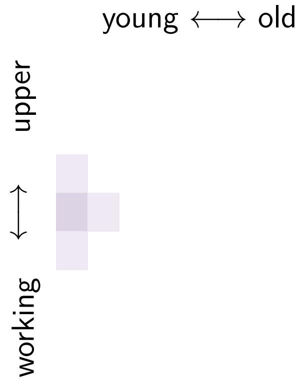
upper

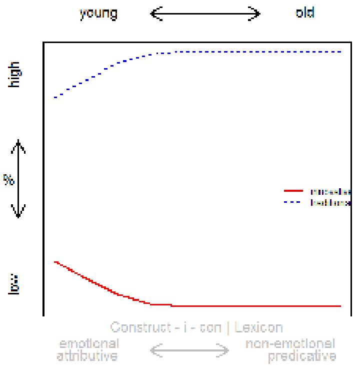
↕

working

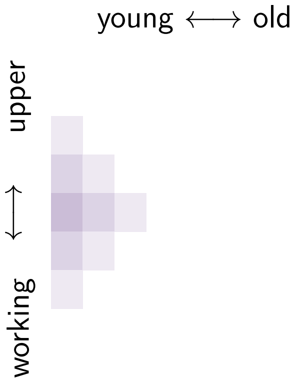


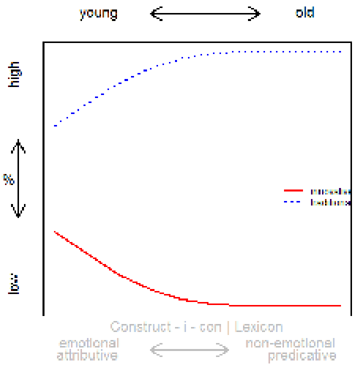
Diffusion of Innovations



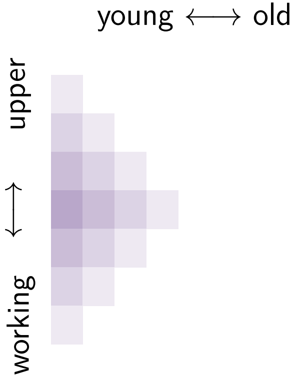


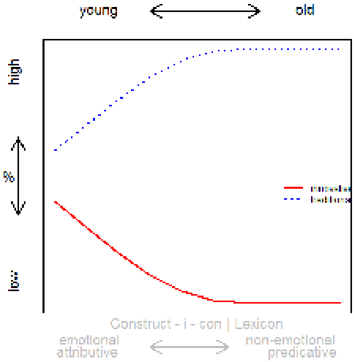
Diffusion of Innovations



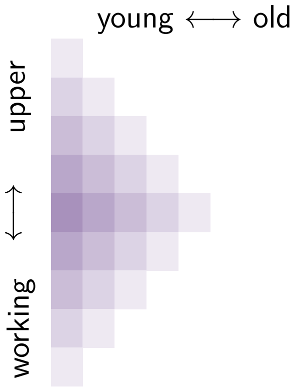


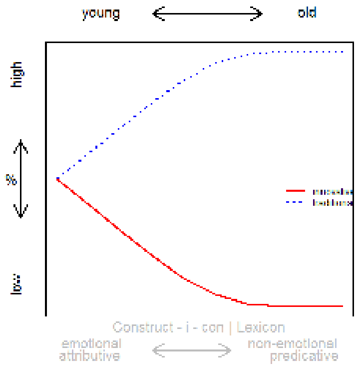
Diffusion of Innovations



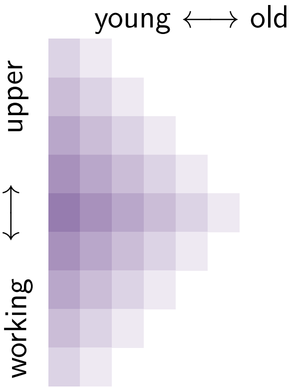


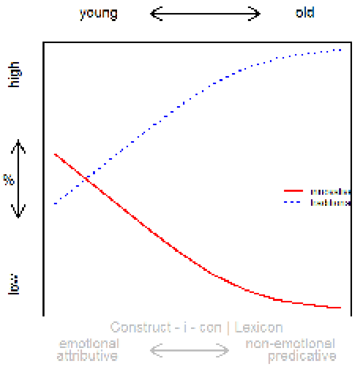
Diffusion of Innovations



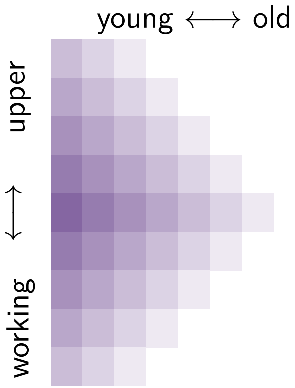


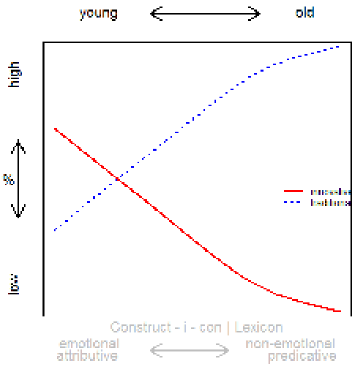
Diffusion of Innovations



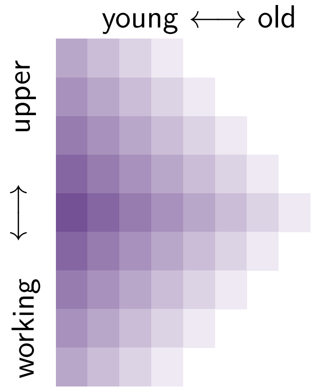


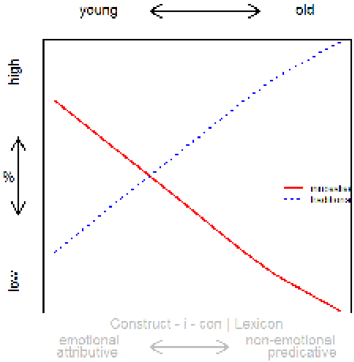
Diffusion of Innovations



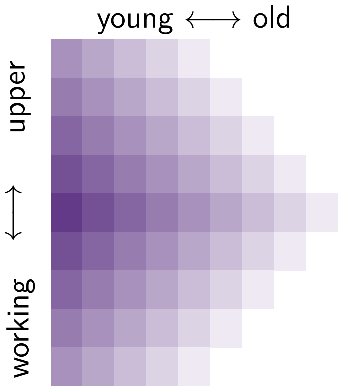


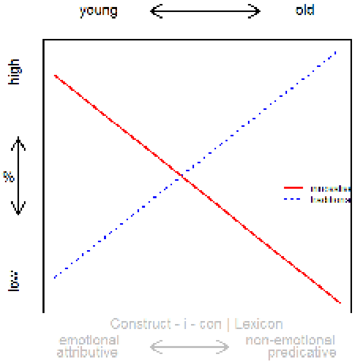
Diffusion of Innovations



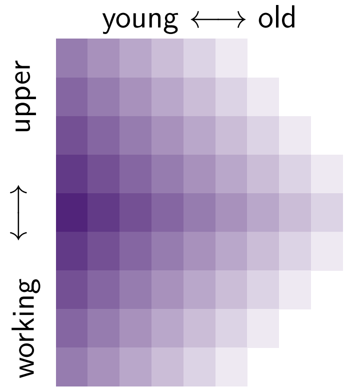


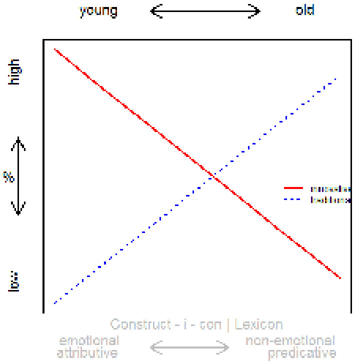
Diffusion of Innovations



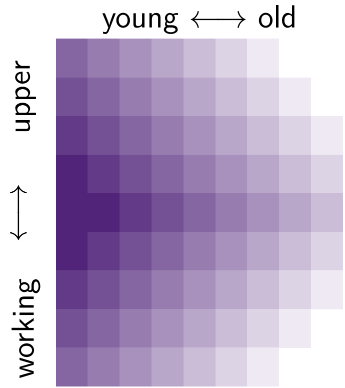


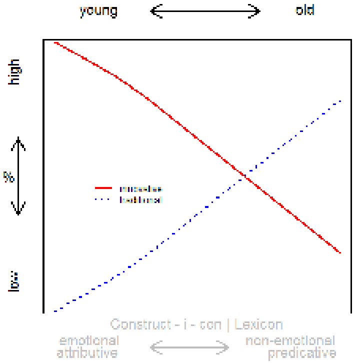
Diffusion of Innovations



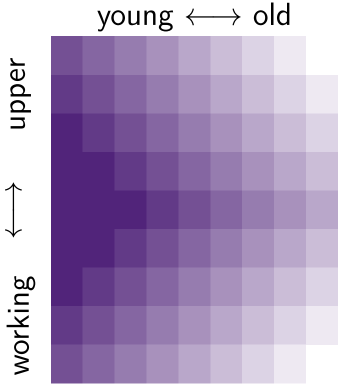


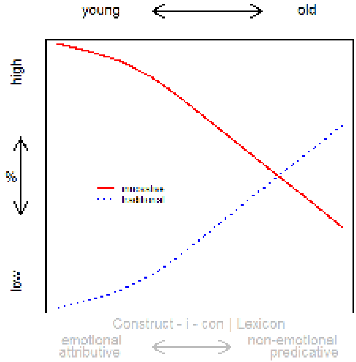
Diffusion of Innovations



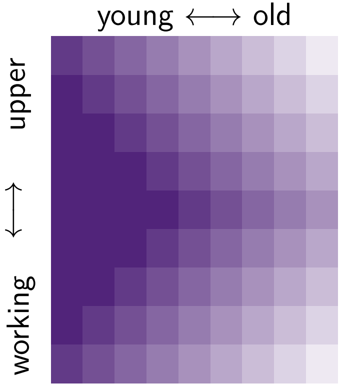


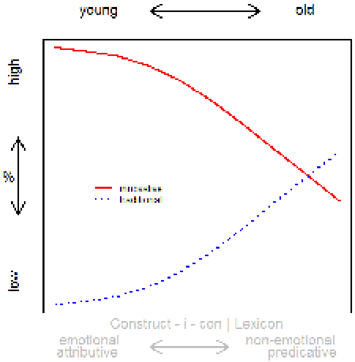
Diffusion of Innovations



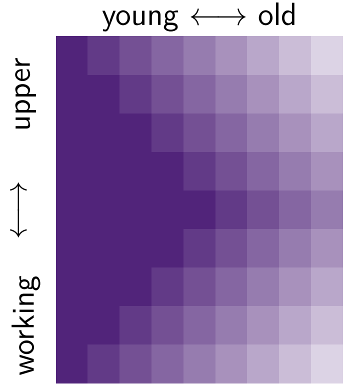


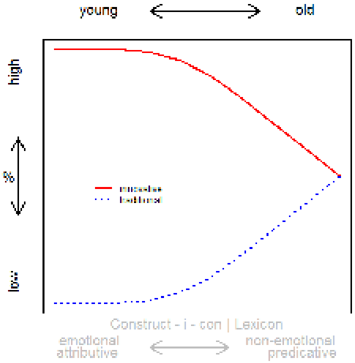
Diffusion of Innovations



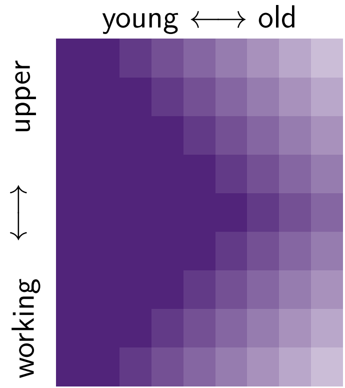


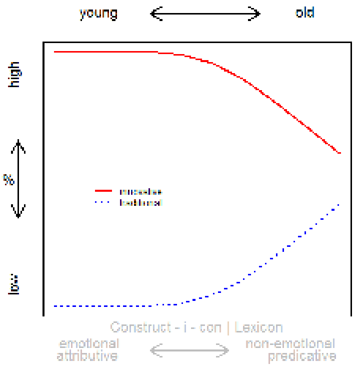
Diffusion of Innovations



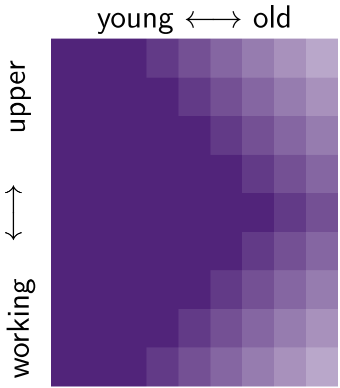


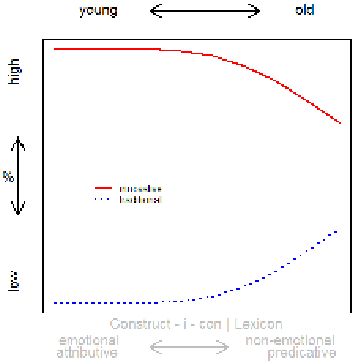
Diffusion of Innovations



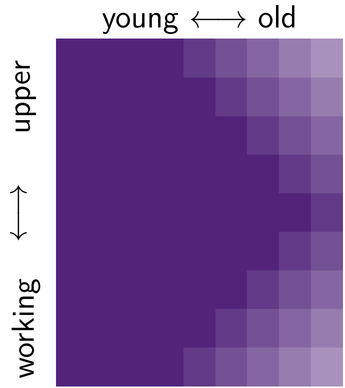


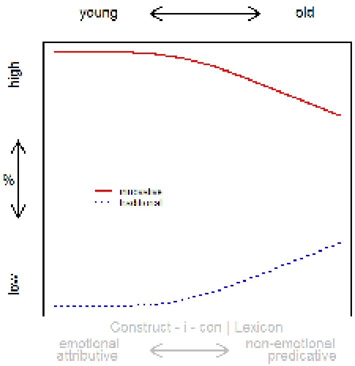
Diffusion of Innovations



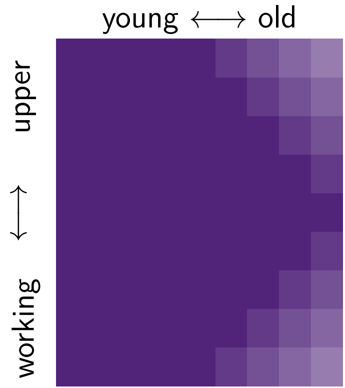


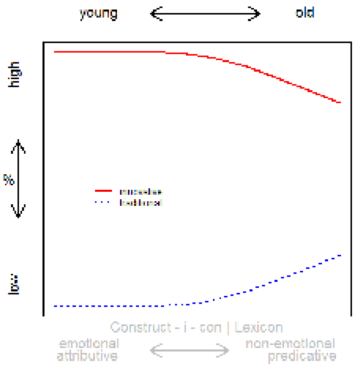
Diffusion of Innovations



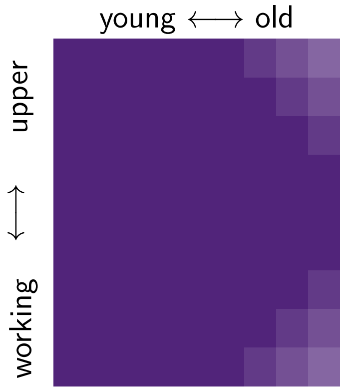


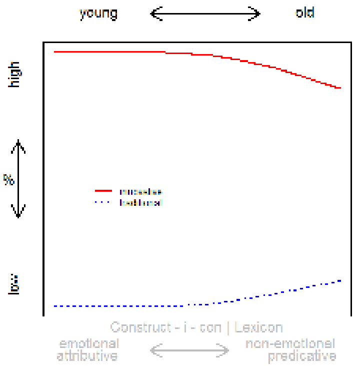
Diffusion of Innovations



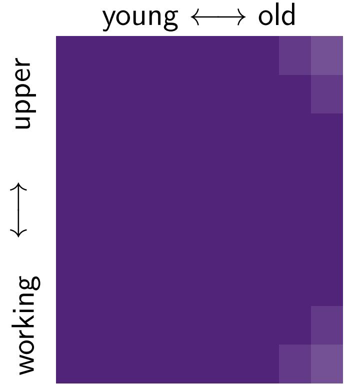


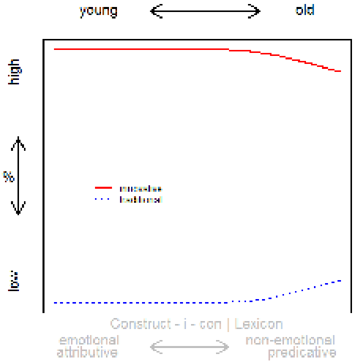
Diffusion of Innovations



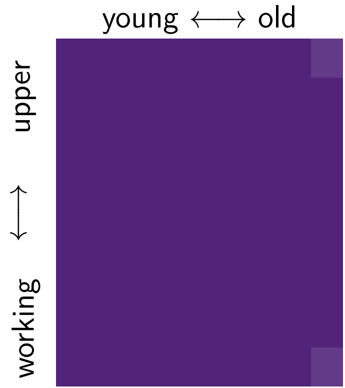


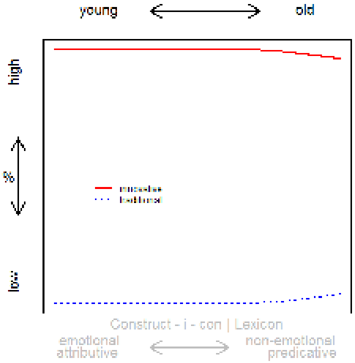
Diffusion of Innovations





Diffusion of Innovations





Diffusion of Innovations