# Social and cognitive foundations of linguistic variation.

## Towards a unified complex-adaptive framework

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Talk given in the Abralin Ao Vivo series

21 March 2022

# 1. Introduction: the broad remit of “linguistic variation”

A randomly chosen, but fairly representative definition:

**variation** variability as a fundamental property of and approach to studying language

**variability** the fact that the realization of language forms is always slightly different from one instance to another, depending upon social, situational, and other factors; i.e. that there are “different ways of saying (encoding) the same thing“

(Schneider 2020: glossary, p. 267)

Schneider, Edgar W. (2020). *English around the world: an introduction,* 2nd ed., Cambridge: Cambridge University Press.

# 1. Introduction: the broad remit of “linguistic variation”

## Variability in the realization of forms

There are variants in

- pronunciation (segmental and supra-segmental)
- morphological markers
- syntactic elements and structures
- spellings
- words chosen
- meanings
- pragmatic and discourse functions
- genres and textual patterns

sociolinguistics

and they are the business of

phonology and phonetics

grammar

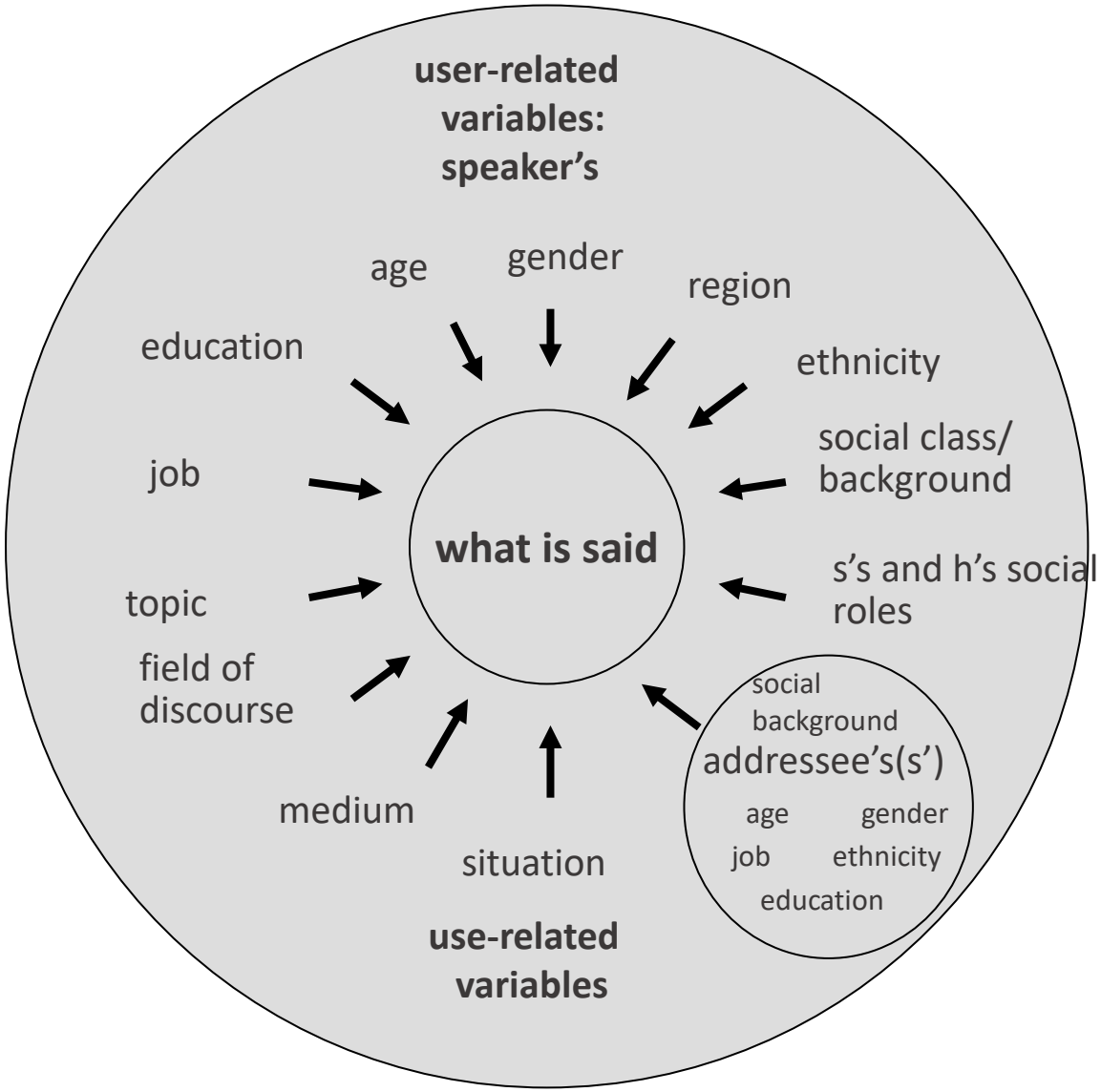
lexicology, stylistics

pragmatics

discourse analysis

# 1. Introduction: the broad remit of “linguistic variation”

## Conditioning factors



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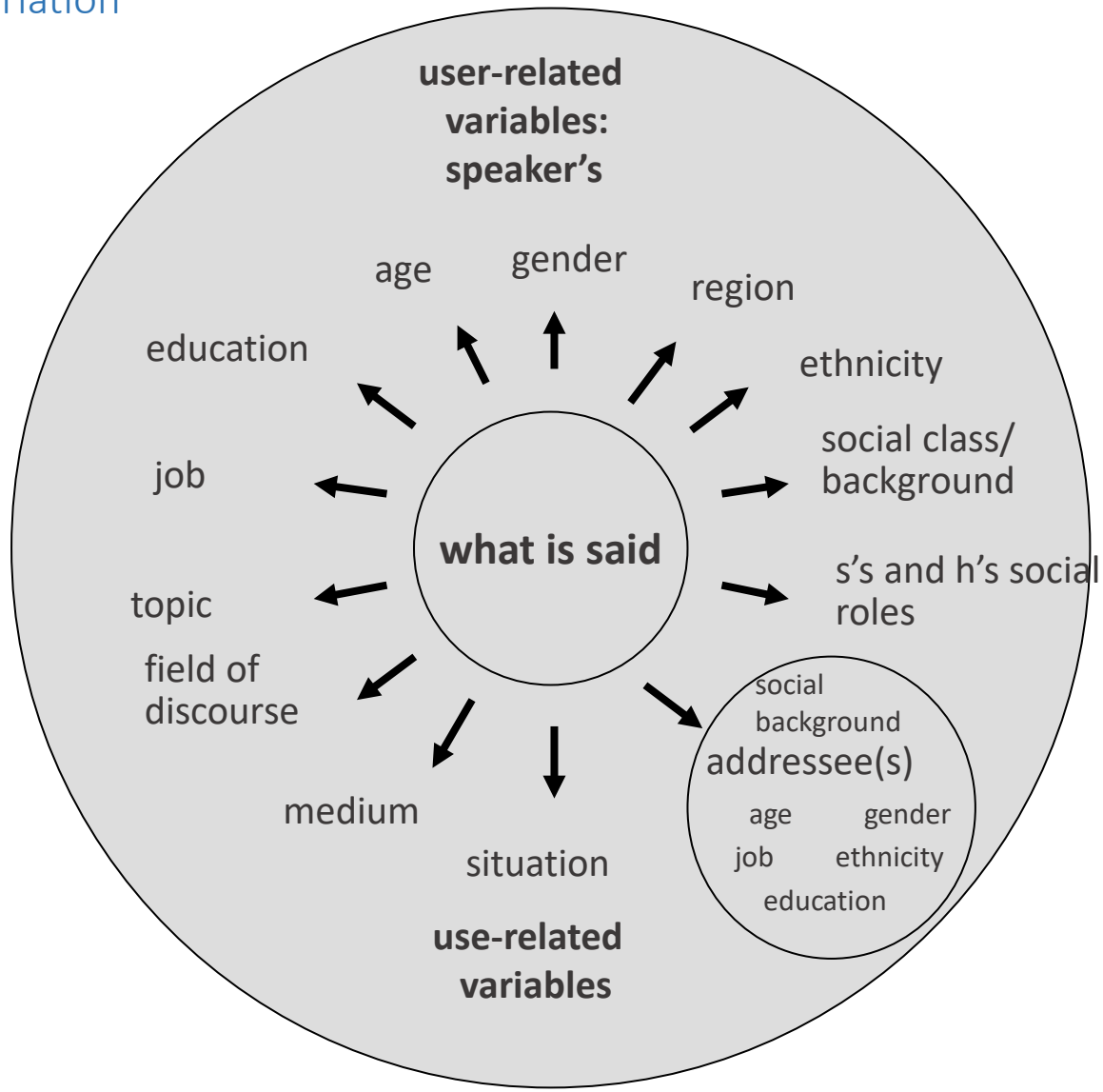
## Indexical potential of variation



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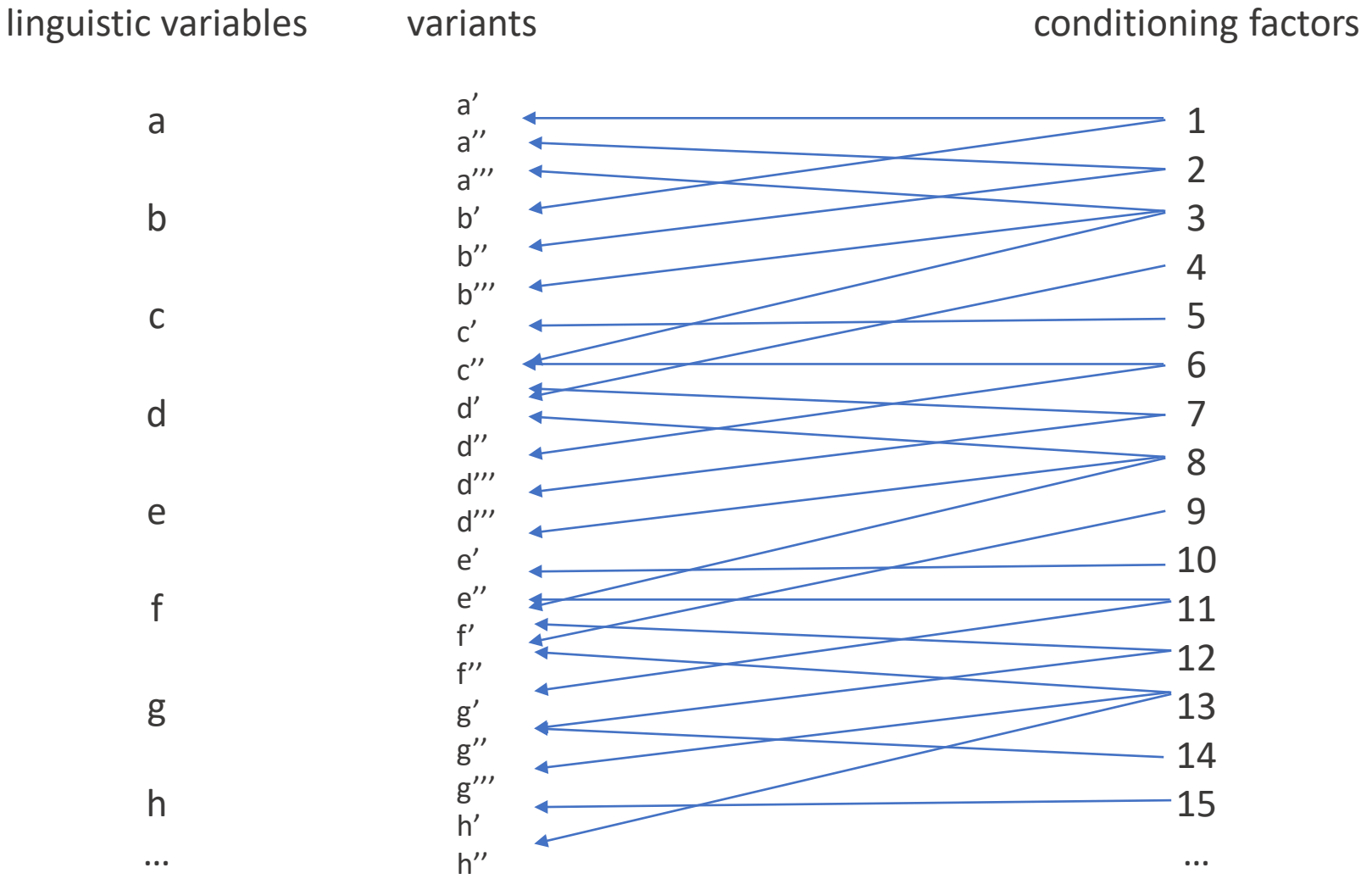
## Thus: a complex issue



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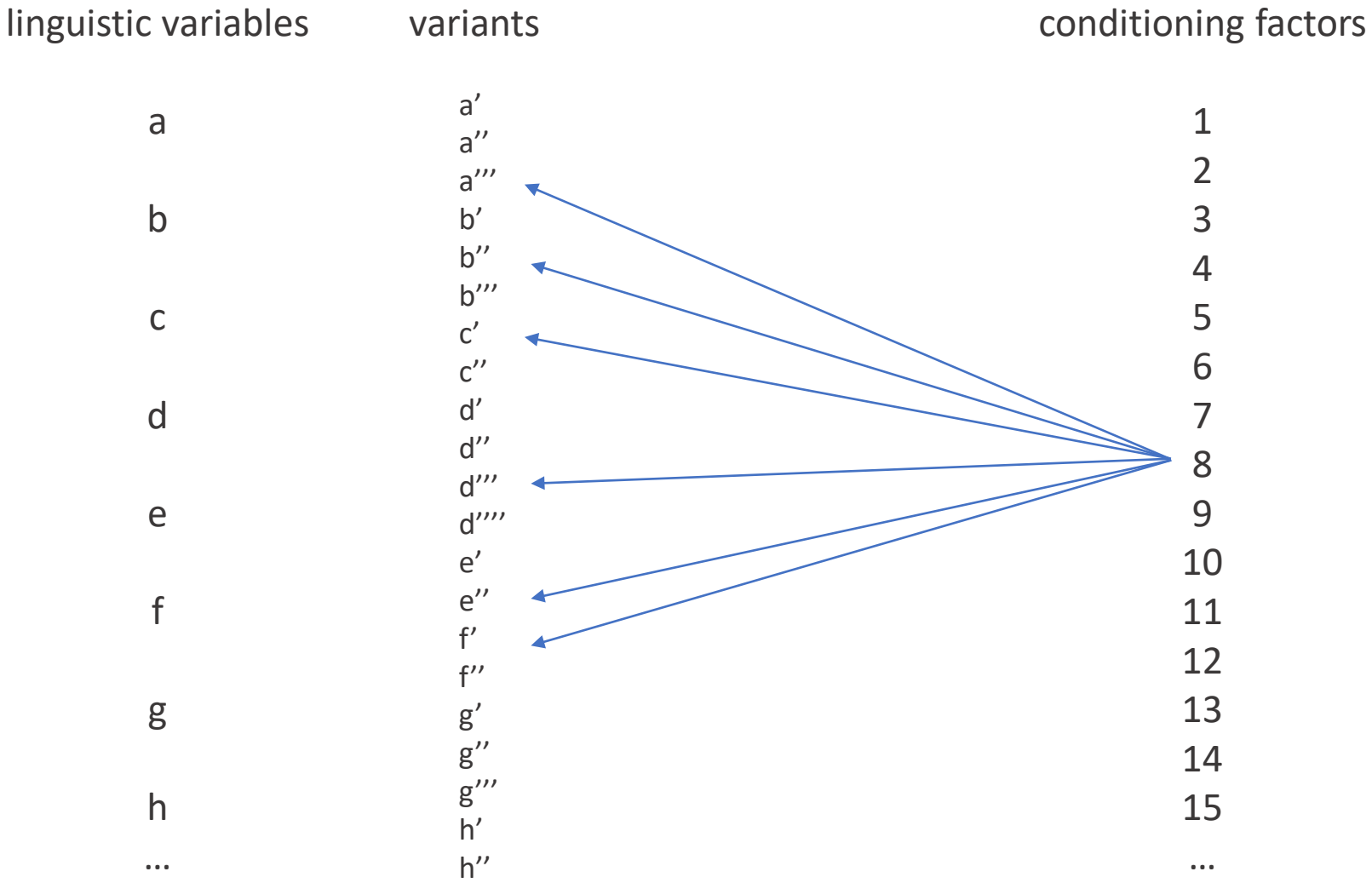

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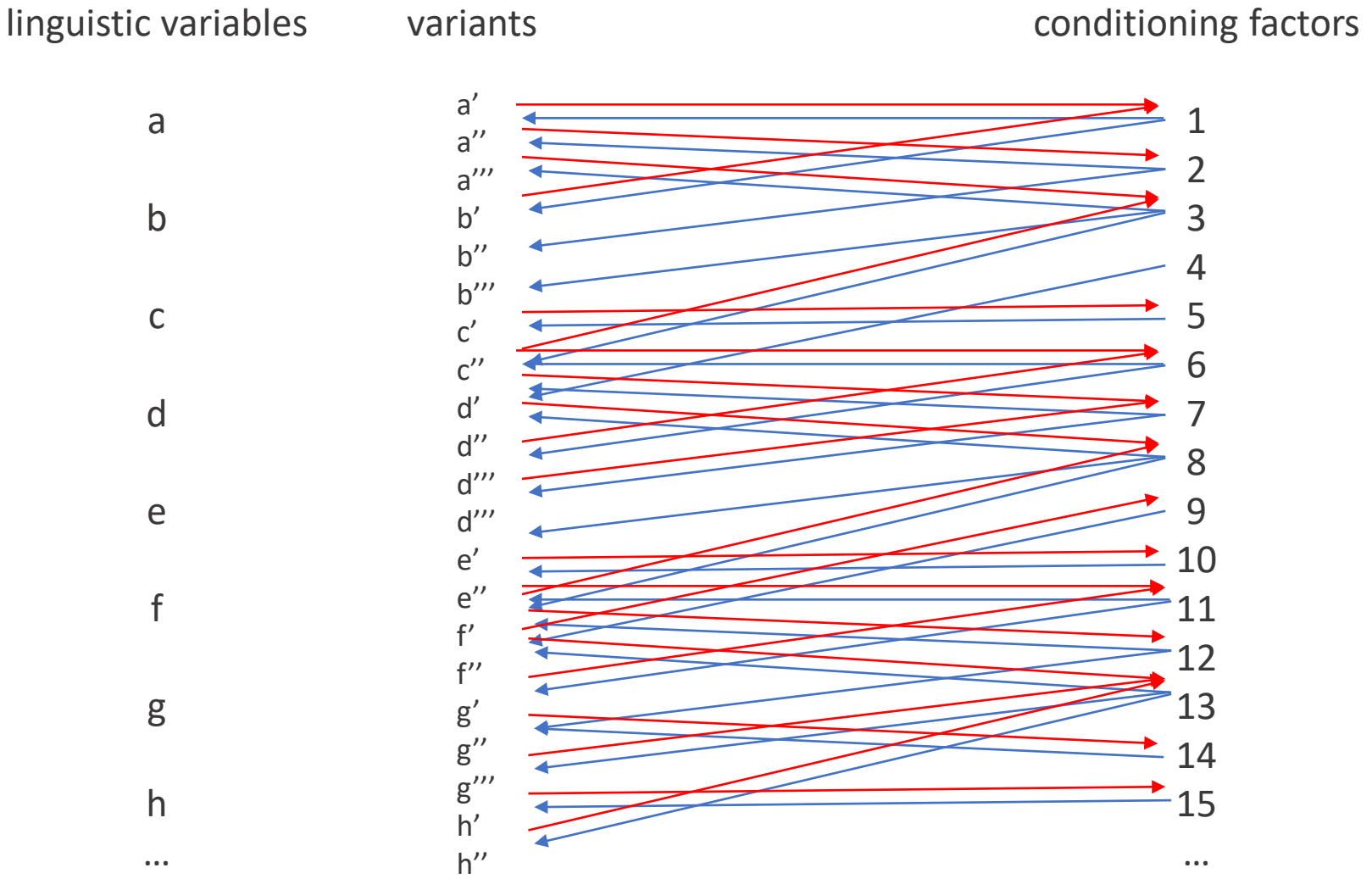

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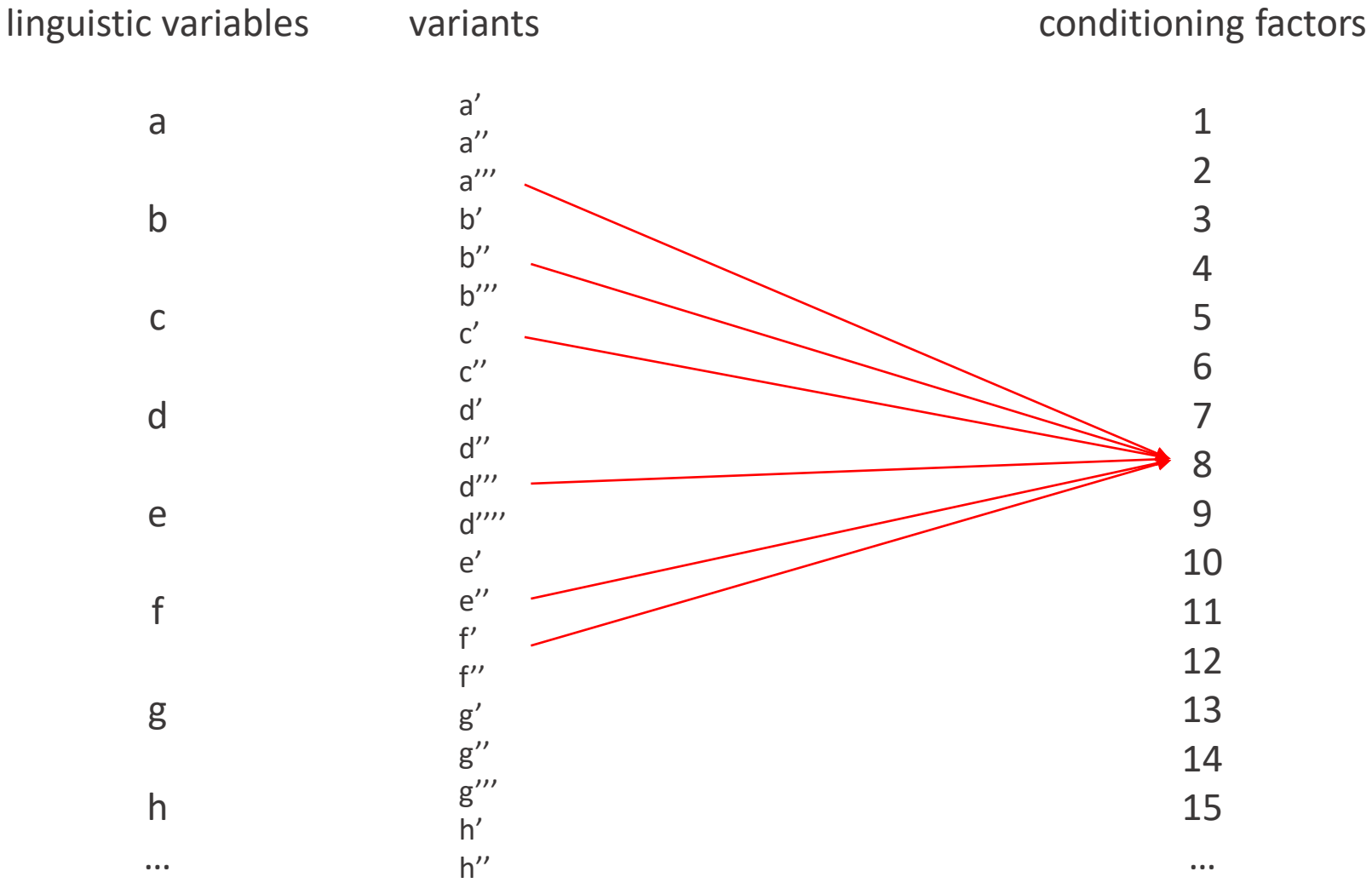

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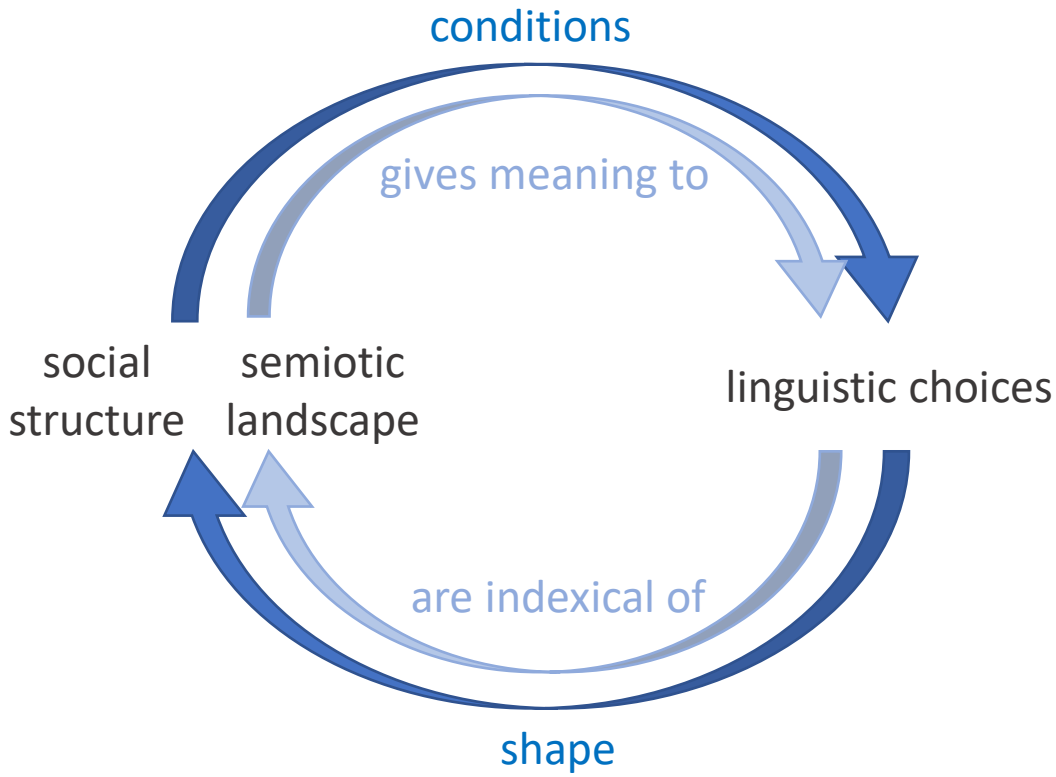


Eckert, Penelope (2019). The individual in the semiotic landscape. *Glossa: a journal of general linguistics*, *4*(1, 14), 1-15.

# 1. Introduction: the broad remit of “linguistic variation”

## Plus: the obnoxious individual and what they know

Weinreich, Labov and Herzog (1968)

> The grammars in which linguistic change occurs are grammars of the speech community. Because the variable structures contained in language are determined by social functions, idiolects do not provide the basis for self-contained or internally consistent grammars.
>
> Weinreich, Labov and Herzog (1968: 188)

Weinreich, U., Labov, W., & Herzog, M. I. (1968). Empirical foundations for a theory of language change. In W. P. Lehmann & Y. Malkiel (Eds.), *Directions for historical linguistics. A symposium* (pp. 95-195). University of Texas Press.

# 1. Introduction: the broad remit of “linguistic variation”

## Plus: the obnoxious individual and what they know

Labov (1989: 52)

> I began this paper with a question about the possible objects of linguistic description. As far as I can see, the individual speaker is not such an object. This essay, like other studies of sociolinguistic variation, shows that individual behavior can be understood only as a reflection of the grammar of the speech community. Language is not a property of the individual, but of the community. Any description of a language must take the speech community as its object if it is to do justice to the elegance and regularity of linguistic structure.

In the same vein: Eckert (2019) and many others

Labov, W. (1989). The exact description of a speech community: Short *a* in Philadelphia. In R. W. Fasold & D. Schiffrin (Eds.), *Language change and variation* (pp. 1-59). John Benjamins.

# 1. Introduction: the broad remit of “linguistic variation”

## Plus: the obnoxious individual and what they know

Ronald Wardaugh (1993: 132), commenting  on the notion of “variable rule”

> A grammar of a language is in one sense a claim about the ‘knowledge’ that speakers of that language have acquired. If some of that knowledge is subtle statistical knowledge about probabilities, how do speakers acquire such knowledge? It is difficult enough to attempt to explain how they acquire abstract linguistic knowledge. How do they also acquire sensitivity to subtle differences in probability? What is an organism like that not only acquires ‘abstract categorical knowledge’, i.e., knowledge that something is or is not in a definite category (something is a *p* not a *b*, is *man* not *men*), but also acquires ‘variable probabilistic knowledge’, i.e., knowledge that some variant is more appropriate than another depending on certain environmental characteristics which are themselves extremely complex and also highly variable, e.g. use of *stickin’* not *sticking* this or that percentage of the time in this or that situation?

Wardhaugh, Ronald (1993), *Investigating language. Central problems in linguistics*, Oxford: Blackwell.

## 2. –ING as a classic example

*fencin, rowin, boxin, kayakin, weightliftin & swimmin*

- Social variation: education, occupation, social background, gender
- Stylistic variation: formality of the situation
- Grammatical variation: grammatical function of –ING

[n] ↓

*going-to* future
progressive forms (*she was runnin' home*)
participles (*runnin' home, she …*)
gerunds (*the switching to metric units*)
derived nouns (*building, meeting, beginning*)
derived adjectives (*interesting, fascinating*)

- Spatial variation: [n] widely diffused, but geographical differences regarding the frequency of its use in interaction with the other three factors.
- Plus: individual preferences, effects of frequency, lexical preferences

## 2. –ING as a classic example

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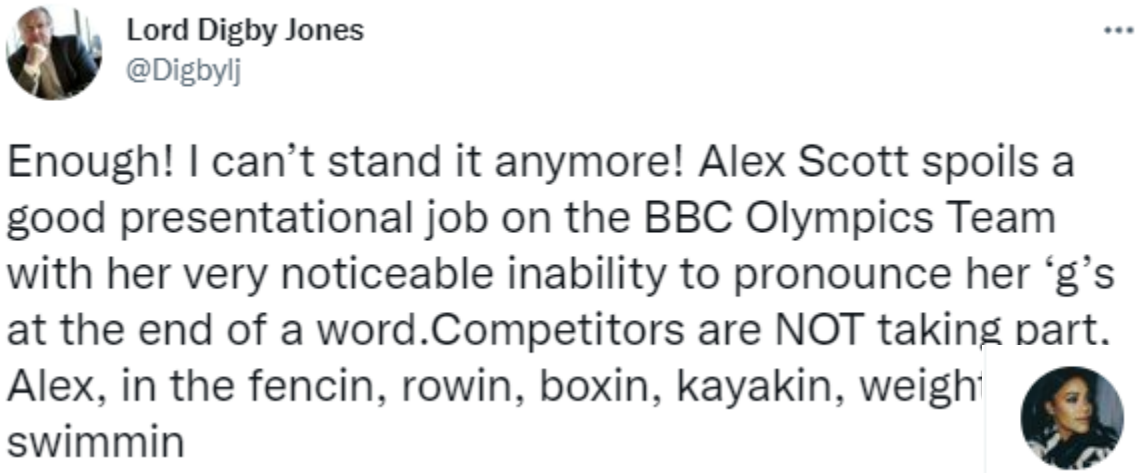
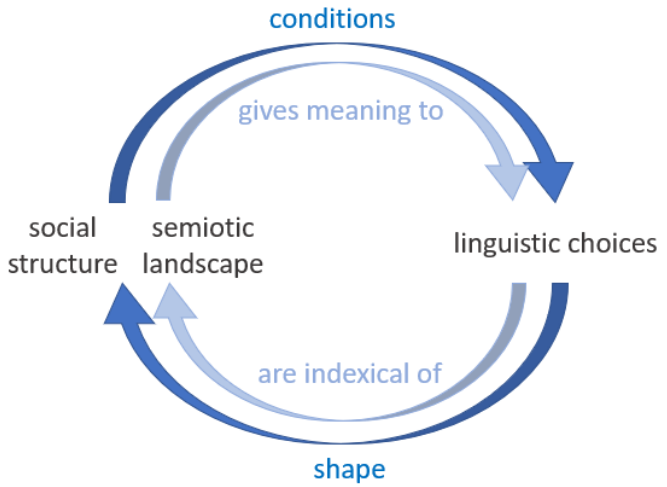



## 3. The goal of this talk and how I want to reach it

Goal: Can we put all this together in one unified framework?

- What are social and cognitive underpinnings of
  - social and situational linguistic variation,
  - inter-individual and intra-individual variation,
  - individual probabilistic linguistic and social knowledge,
  - and the social-semiotic feedback loop?



## 3. The goal of this talk and how I want to reach it

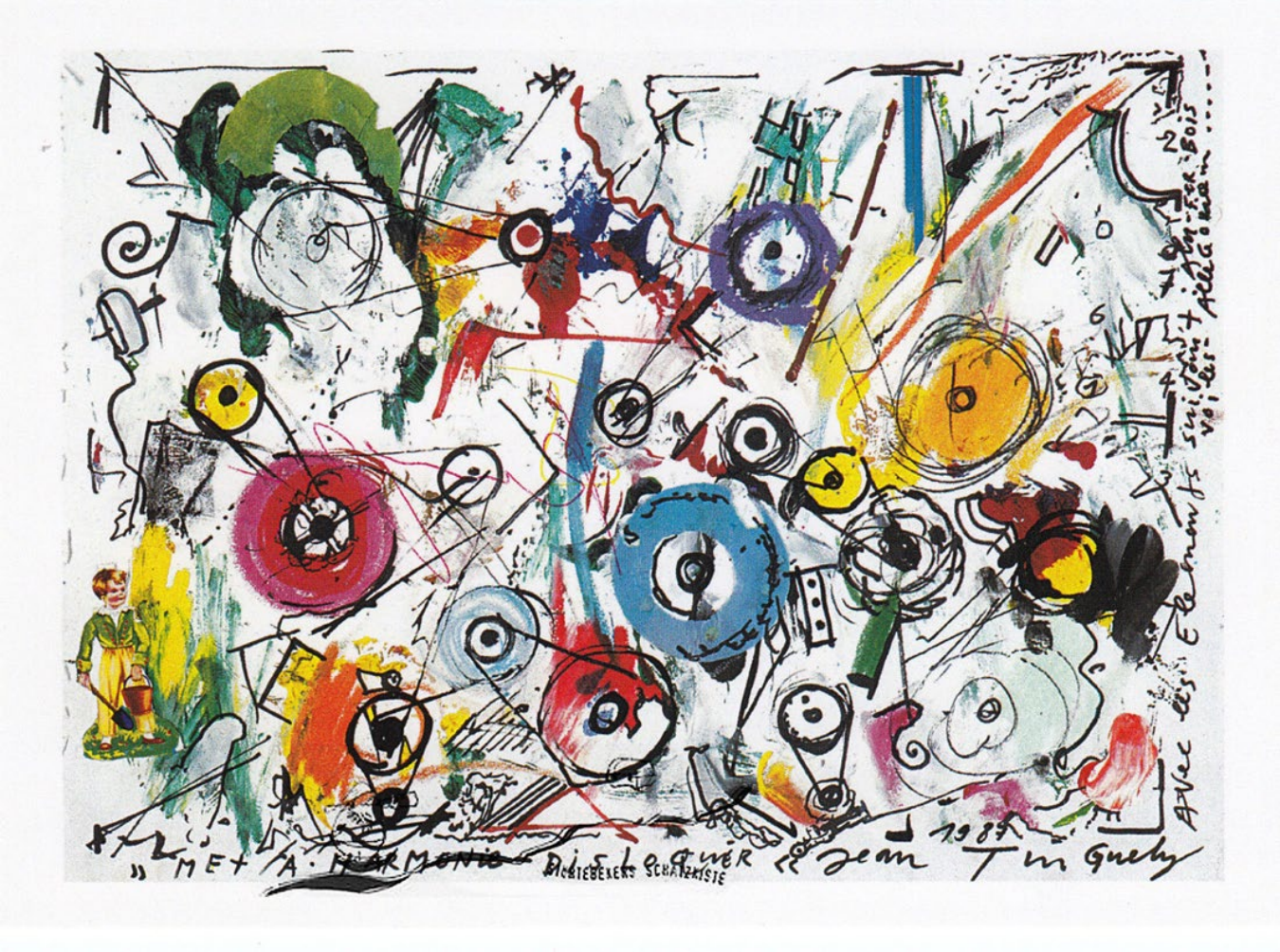
### Plan

4. The Entrenchment-and-Conventionalization Model (Schmid 2015, 2020)
5. What are conventions?
6. How does conventionalization work?
7. Why are conventions variable?
8. How does entrenchment work and what is its contribution to linguistic variation?
9. Predictions and applications
10. Social and cognitive underpinnings of linguistic variation
11. Conclusion: possible advantages of the overall approach

Schmid, H.-J. (2015). A blueprint of the Entrenchment-and-Conventionalization Model. *Yearbook of the German Cognitive Linguistics Association*, *3*(1), 3-25.
Schmid, H.-J. (2020). *The dynamics of the linguistic system. Usage, conventionalization, and entrenchment*. Oxford University Press.

# 4. The Entrenchment-and-Conventionalization Model (Schmid 2015, 2020)

## Jean Tinguely



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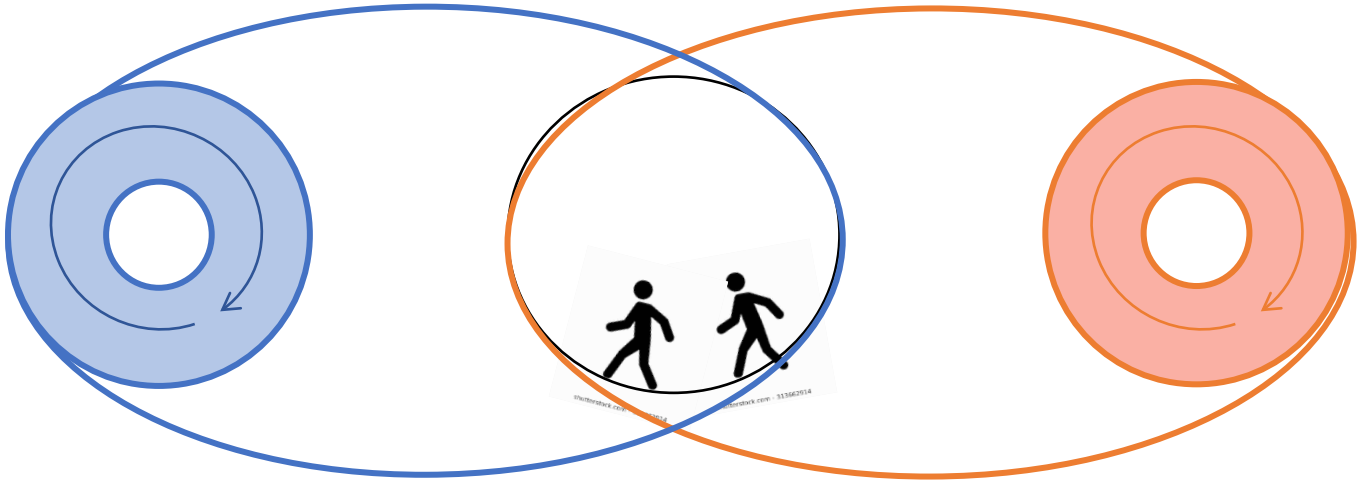

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## The Tinguely machine

Usage:
repeated
usage events

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Community/Society:
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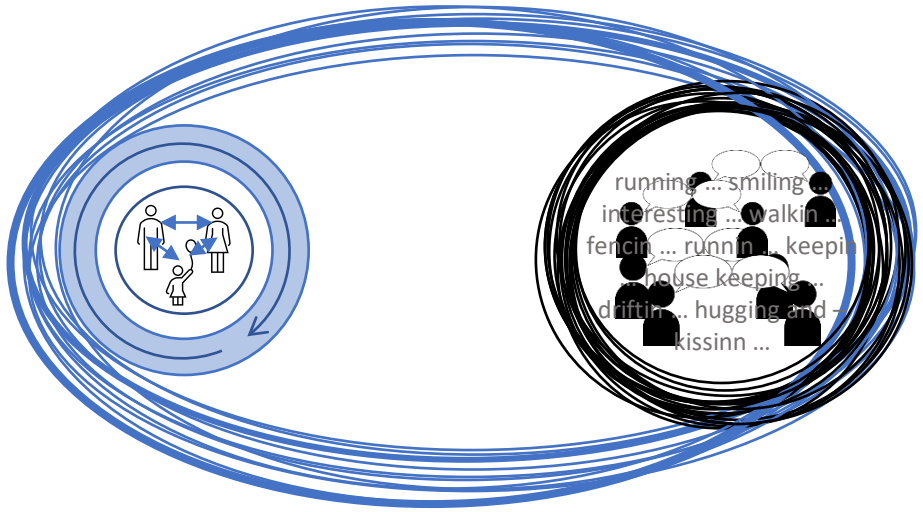

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Community/Society:
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Usage:
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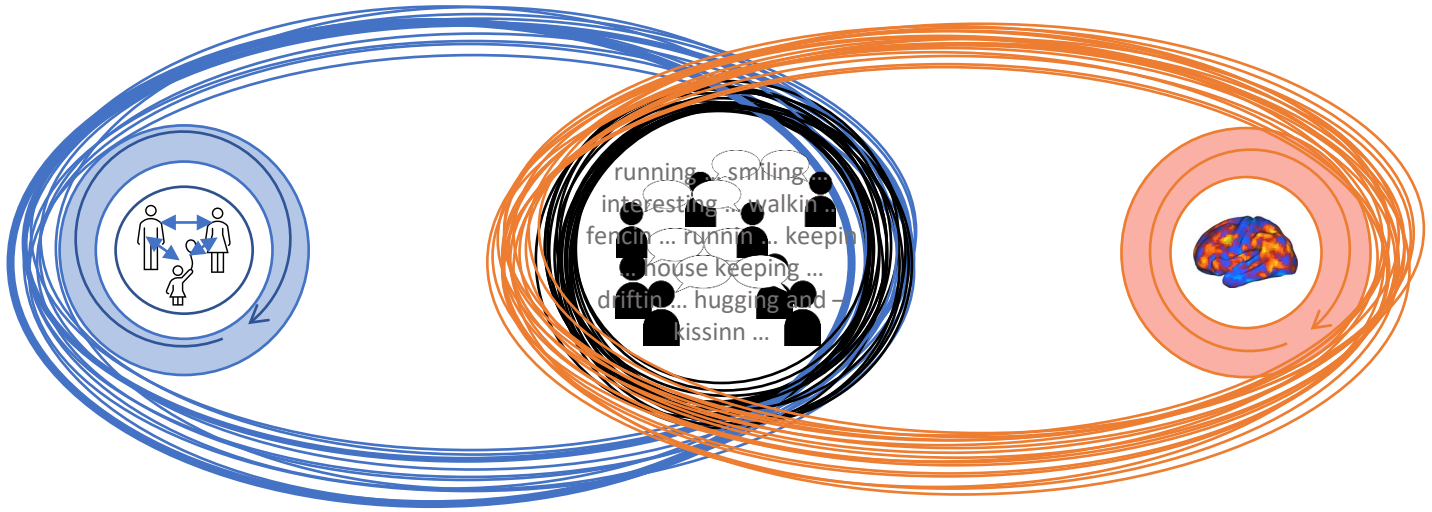
Cognition/Mind:
Entrenchment
feedback cycle



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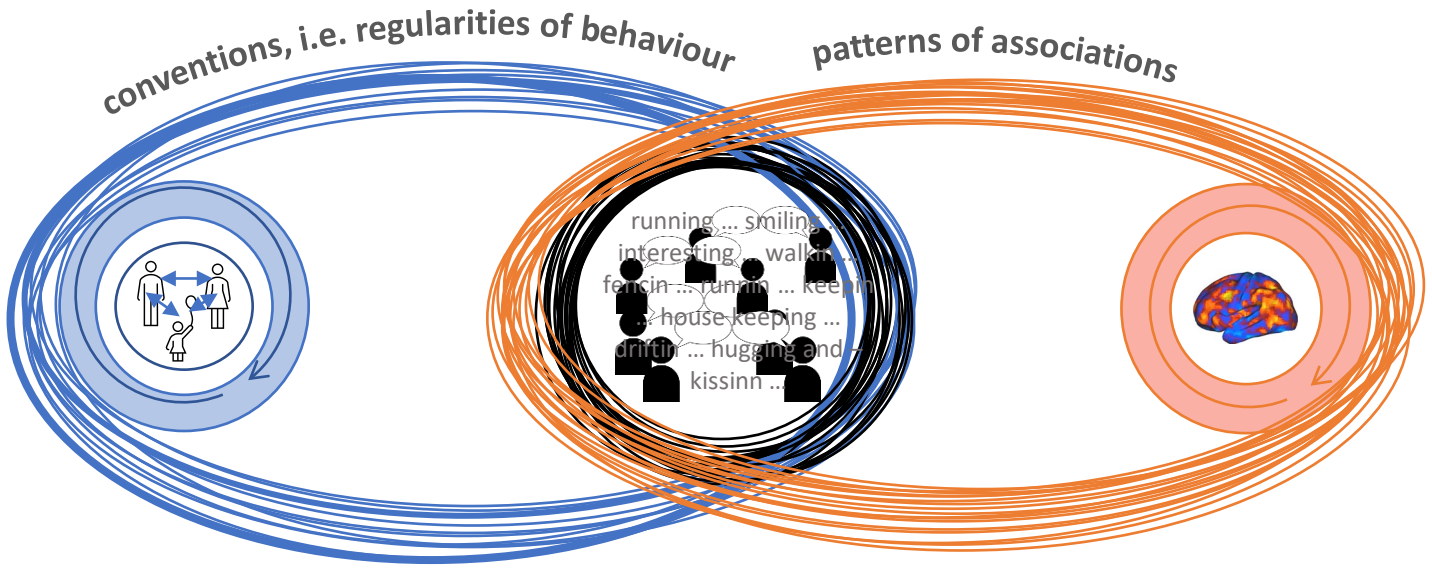

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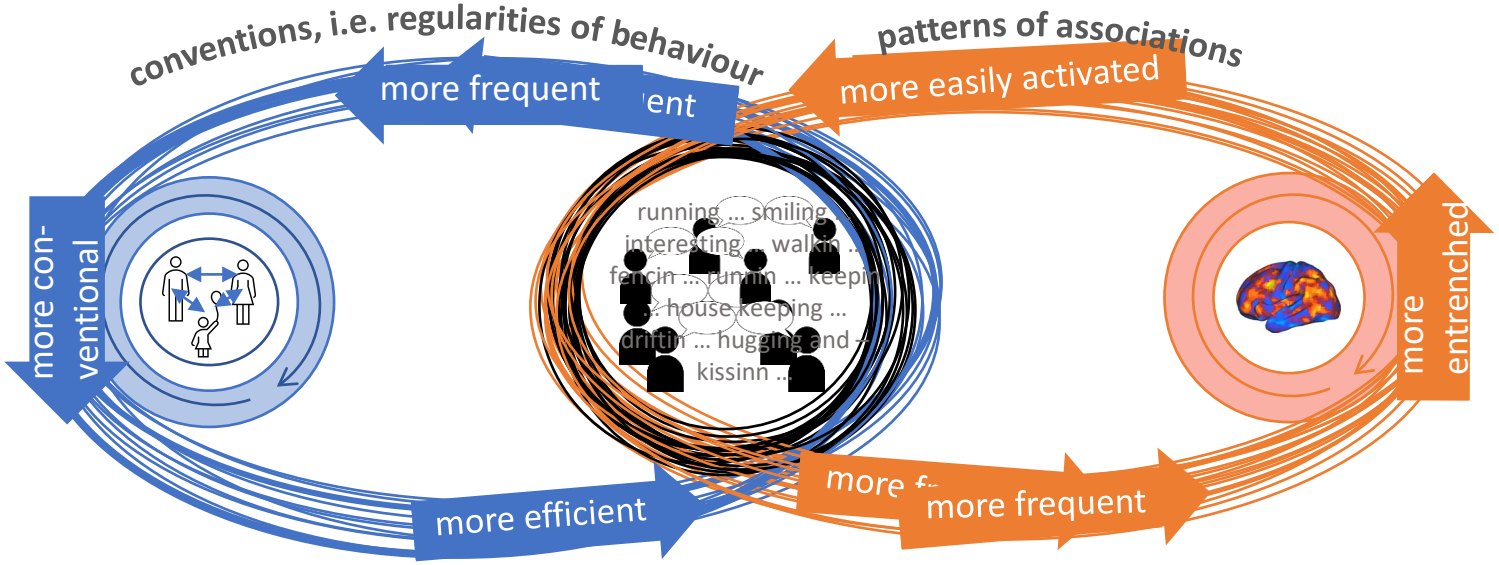

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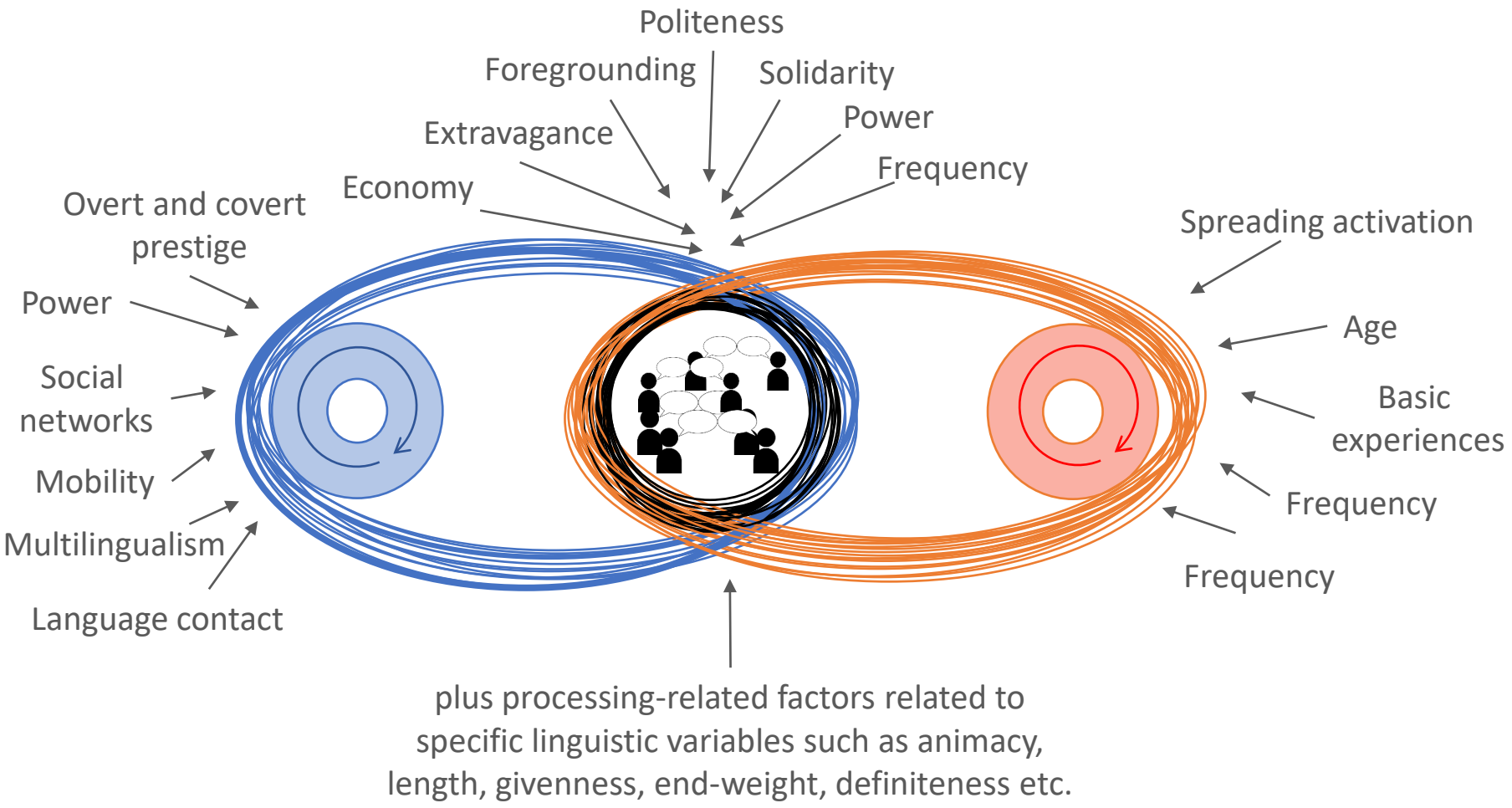
## Forces affecting the three components



## 5. What are conventions?

Mutually known **regularities of behaviour** which the members of a community conform to because they mutually expect each other to conform to them.

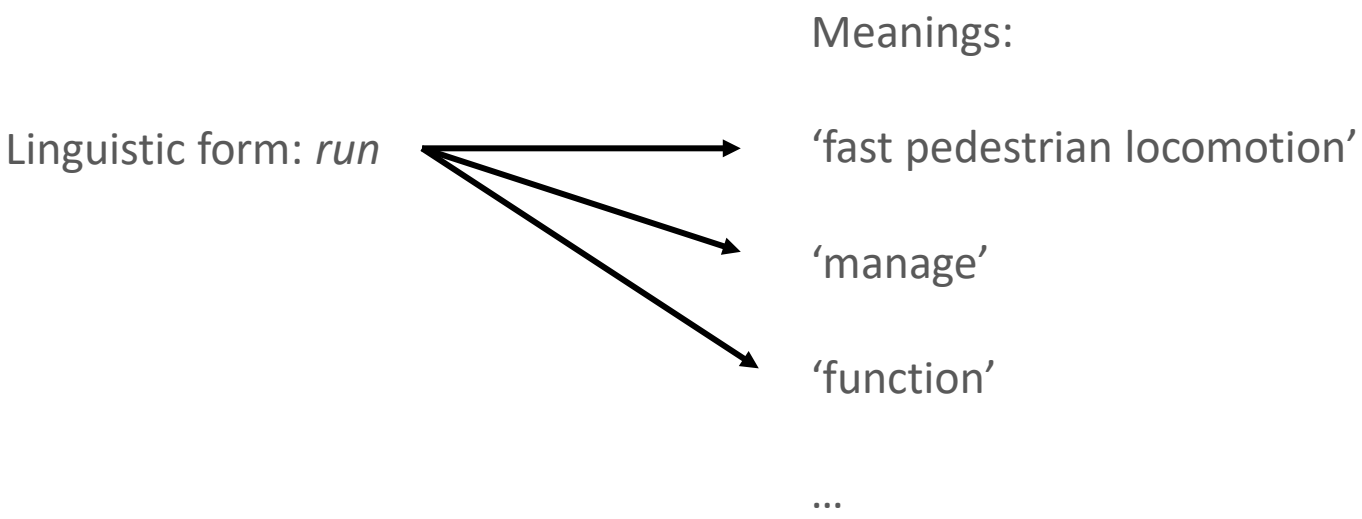
Based on: Lewis (1969), Schiffer (1972), Clark (1996), Croft (2000), and Keller (1994, 2014)


Clark, Herbert (1996). *Using Language*, Cambridge: Cambridge University Press.
Croft, William (2000). *Explaining Language Change: An Evolutionary Approach*, Harlow/New York: Longman.
Keller, Rudi (2014). *On Language Change: The Invisible Hand in Language*, New York: Routledge.
Keller, Rudi (1995). *Zeichentheorie*, Tübingen: Francke.
Lewis, David K. (1969). *Convention: A Philosophical Study*, Cambridge, MA: Harvard University Press.
Schiffer, Stephen R. (1972). *Meaning*, Oxford: Clarendon Press.

## 5. What are conventions?

### What is a linguistic “regularity of behaviour”?

Semasiological regularity



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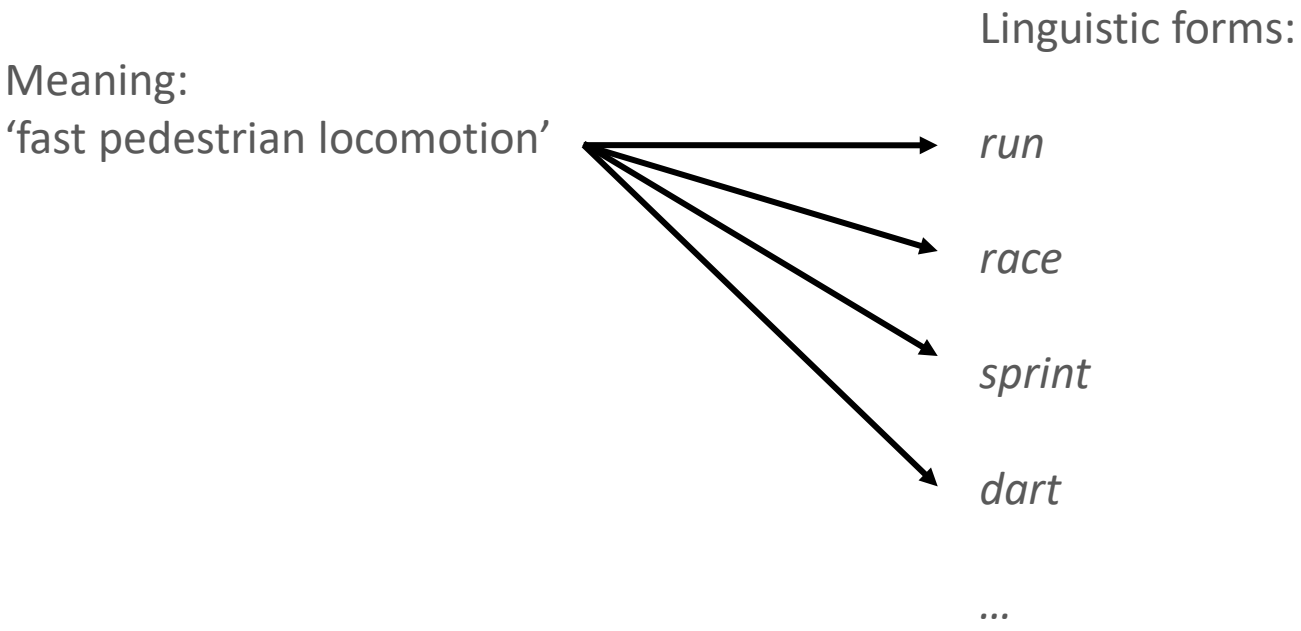
Onomasiological regularity



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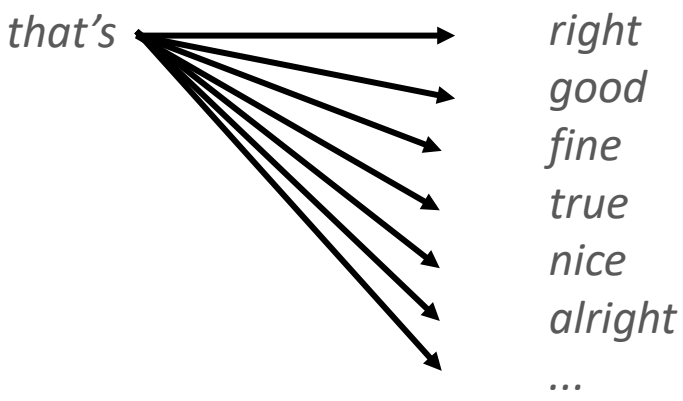
What is a linguistic “regularity of behaviour”?

Syntagmatic regularity

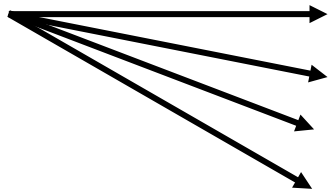


## 5. What are conventions?

What is a linguistic “regularity of behaviour”?

Contextual regularity

Communicative goal: greet



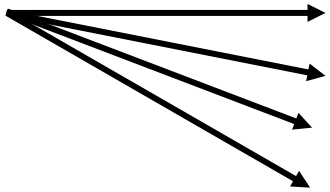
Linguistic forms:
*Good morning*
*Good afternoon*
*Good evening*
*Hello*

# 5. What are conventions?

What is a linguistic “regularity of behaviour”?

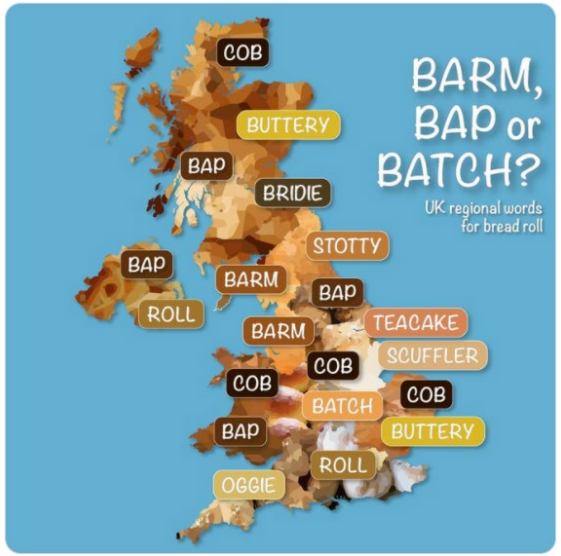
Social (‘community-related’) regularity

Meaning:
‘bread roll’



What do you call a bread roll? #AfternonTeaWeek #bread #UK #GreatBritain #breadroll #map #dialect

Tweet übersetzen



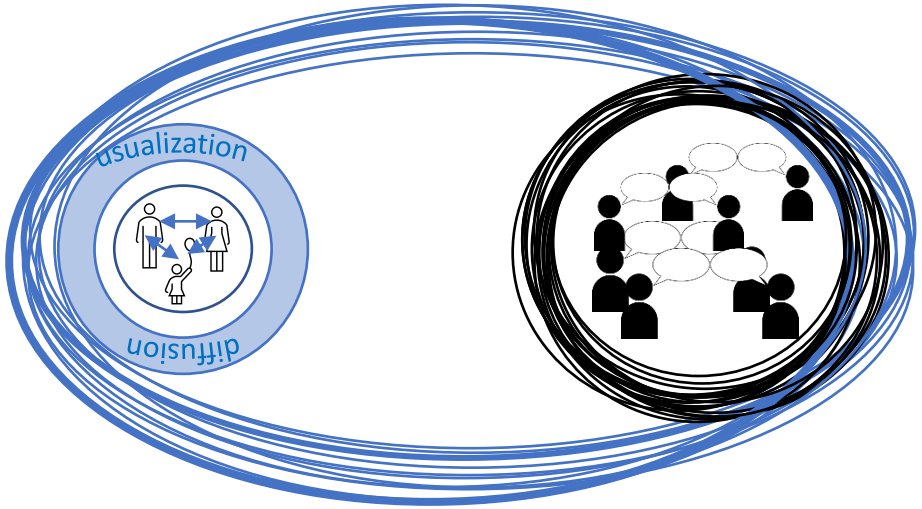
## 5. What are conventions?

### What is a linguistic “regularity of behaviour”?

- onomasiological regularity
- semasiological regularity
- syntagmatic regularity
- contextual regularity
- social regularity

# 6. How does conventionalization work?

## Two feedback loop processes: usualization and diffusion



## 6. How does conventionalization work?

### Two feedback loop processes: usualization and diffusion

- **Usualization**: establishing and sustaining regularities of linguistic behaviour

To what extent do the members of a group adhere
to a convention, regardless of the size of the group?

## 6. How does conventionalization work?

### Two feedback loop processes: usualization and diffusion

- **Usualization**: establishing and sustaining regularities of linguistic behaviour

  To what extent do the members of a group adhere to a convention, regardless of the size of the group?

- **Diffusion**: spread of regularities of linguistic behaviour across speakers, groups, communities and contexts

  How many speakers or groups adhere to a convention and in what kinds of situations, regardless of the extent to which they do?

## 7. Why are conventions variable?

### The ultimate source of variable conventions: rich mutual understanding in usage events

Langacker's conception of "usage events"

"Also, units emerge from *usage events* – instances of language use in the full detail of their contextual apprehension – by the reinforcement of recurring commonalities. One recurring feature is the very fact that the speaker and hearer are interacting by using the language in question. Hence the *ground* (the interlocutors, their interaction, and its circumstances) figures at least peripherally in the import of every unit. Indeed, abstracted units can incorporate any facet of the speech situation common to the usage events giving rise to them, such as the following: age, gender, and status of the interlocutors; their social relationship; nature of the occasion; degree of formality; attitudinal, emotive, and affective factors; and the language (or conceived linguistic variety) employed.

Langacker (2016: 469)

Langacker, Ronald (2016), Working towards a synthesis. *Cognitive Linguistics,* 27(4), 465-477.

# 7. Why are conventions variable?

## The ultimate source of variable conventions: rich mutual understanding in usage events

- setting
- social relations
- activity type

**situational context**

- communicative goals
- speaker meaning
- speaker emotions
- social characteristics

→ **utterance form** ←

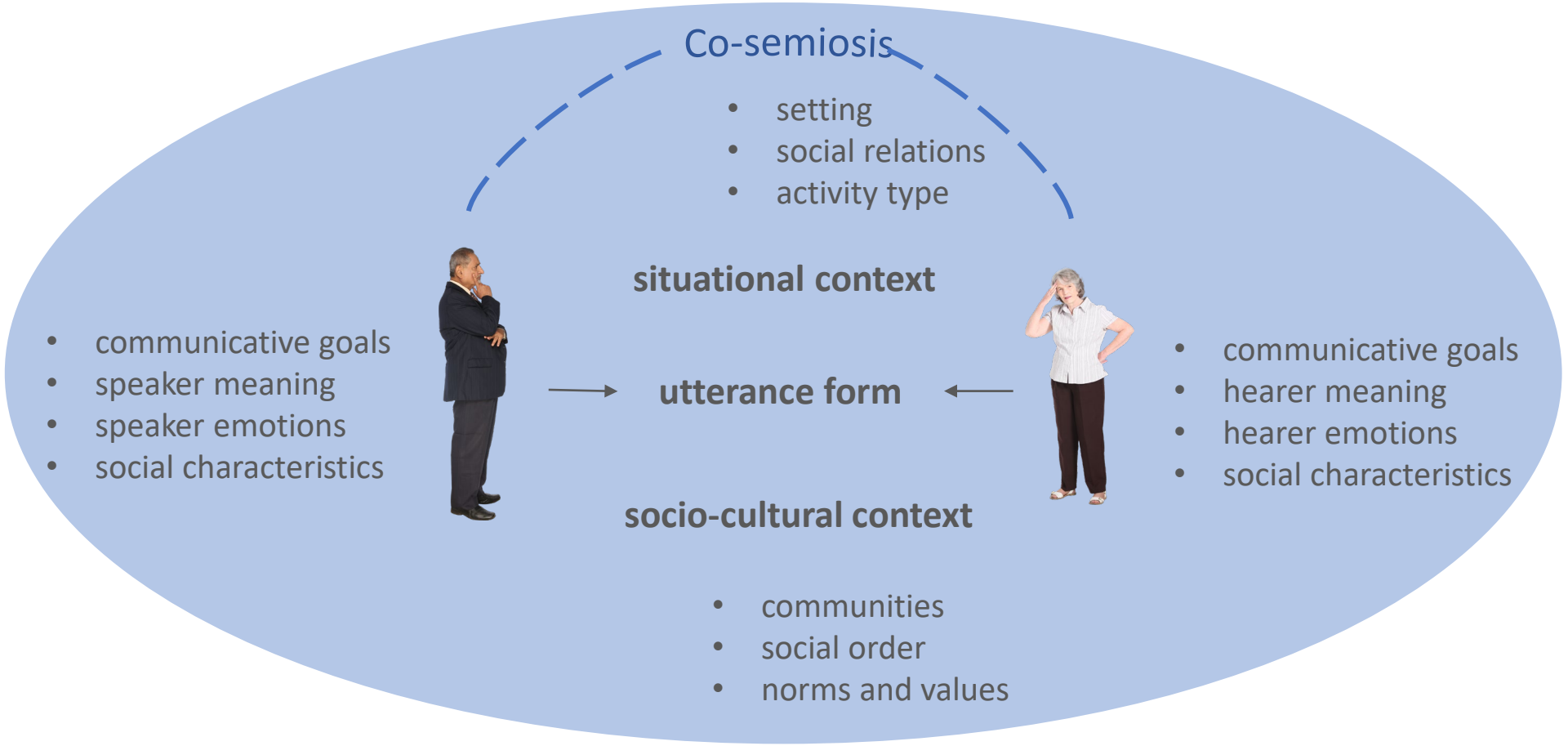
- communicative goals
- hearer meaning
- hearer emotions
- social characteristics

**socio-cultural context**

- communities
- social order
- norms and values

# 7. Why are conventions variable?

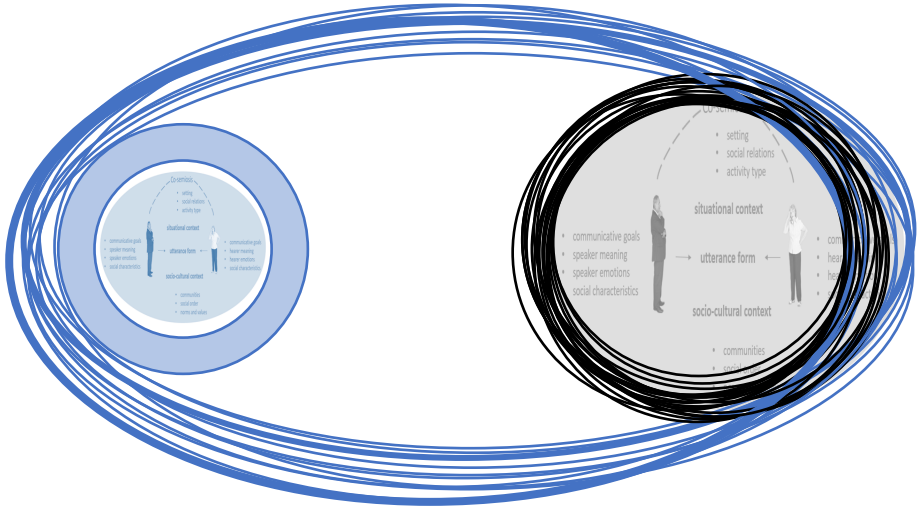
The ultimate source of variable conventions: rich mutual understanding in usage events




**All components of usage events have the potential to become entrenched and conventionalized!**

# 7. Why are conventions variable?

The usualization of rich usage events into multi-dimensional and probabilistic conventions



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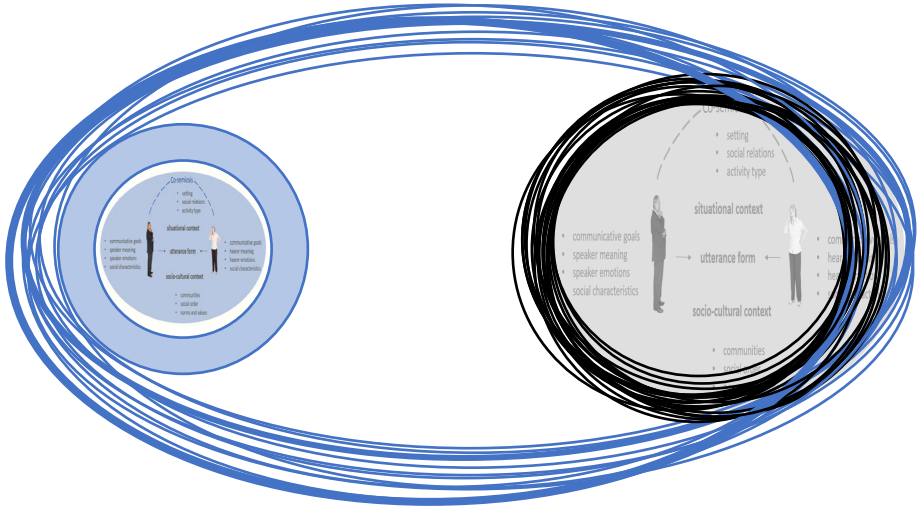

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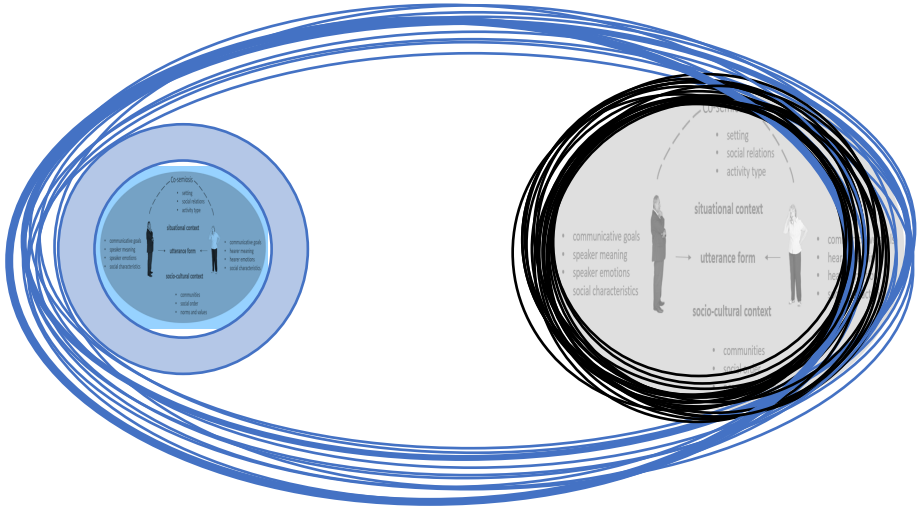

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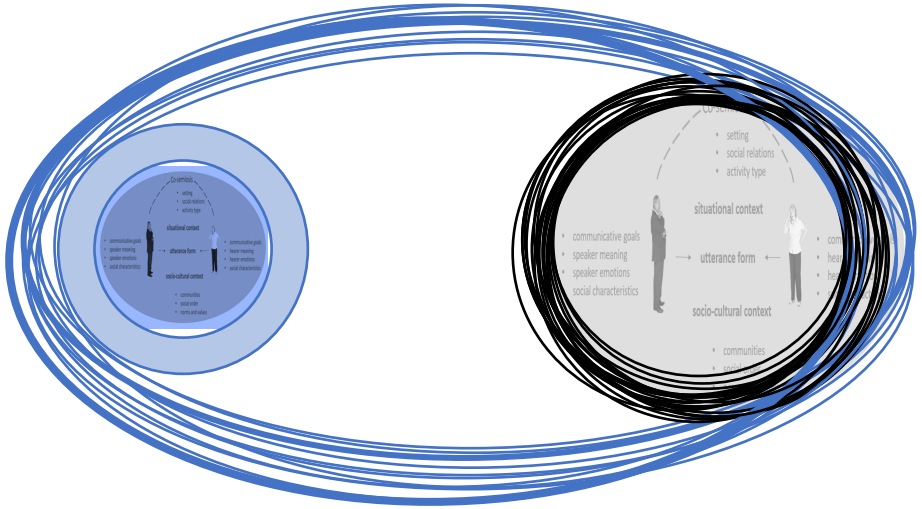

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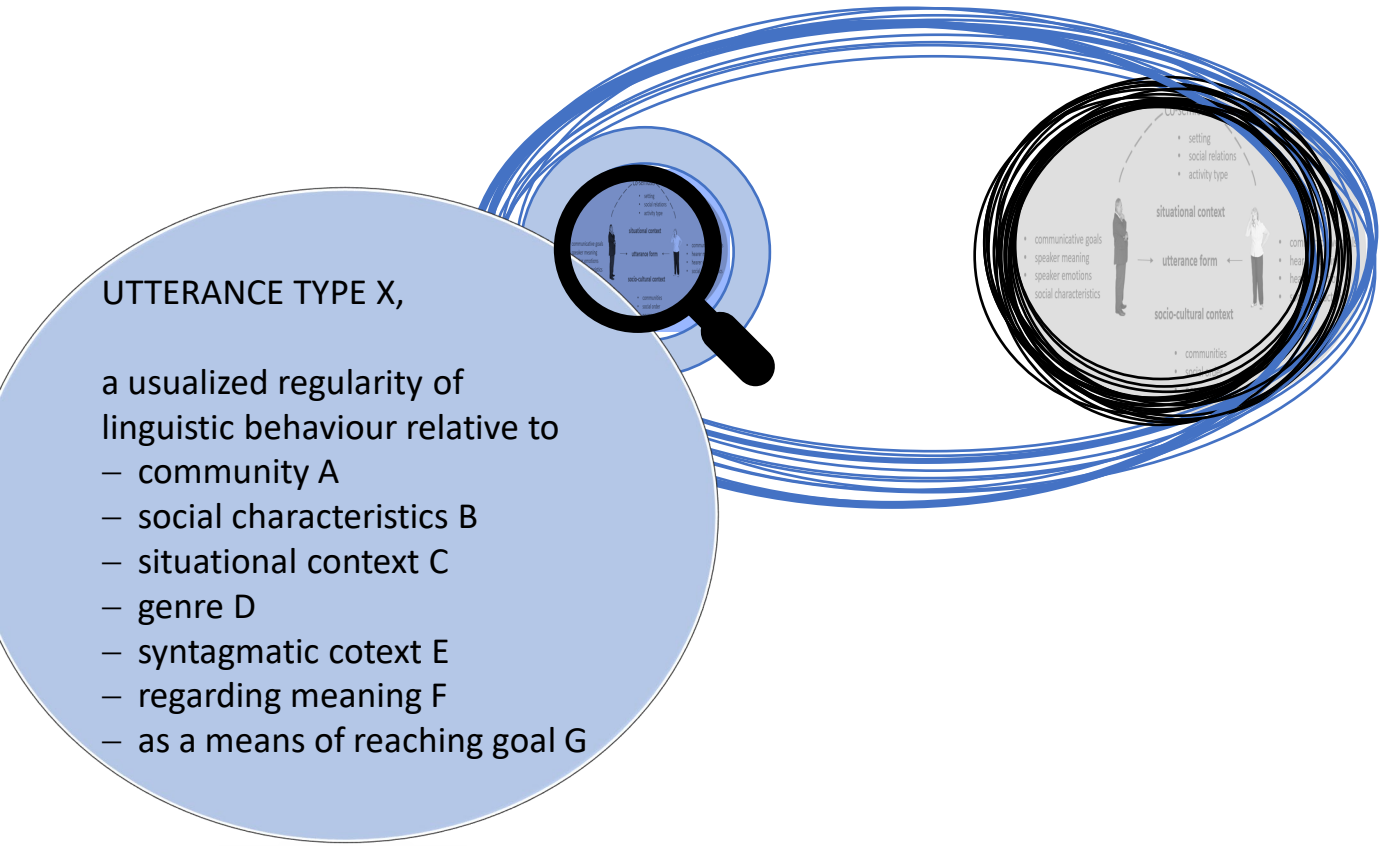


UTTERANCE TYPE X,

a usualized regularity of linguistic behaviour relative to

- community A
- social characteristics B
- situational context C
- genre D
- syntagmatic cotext E
- regarding meaning F
- as a means of reaching goal G

## 7. Why are conventions variable?

### The usualization of rich usage events into multi-dimensional and probabilistic conventions

Nota bene:

- This is not about knowledge or learning!
- Instead it is just a matter of probabilistic regularities of behaviour, i.e. it being so and so more or less likely that form x or form y or form n is used under conditions a, b, c … z
- And it is simply a matter of past usage history: conventionalized utterance types are rich probabilistic records of their own usage history

# 7. Why are conventions variable?

## Summary

- Linguistic conventions are variable because they are multi-dimensional records of the probabilistic regularity in their own usage history
- If we neglect codification (grammars, dictionary), that's all speakers can go by: patterns of regularity in usage history
- Usualization corresponds to what the patterns are and how regular they are
- Diffusion handles the situational grounding and social pathways on which usualization comes into effect
- Social-semiotic feedback loop is integrated by multiple ways of accessing this record

- How is all this represented in the mind and processed in usage?

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## What is entrenchment?

- Continual re-organization of linguistic knowledge in the minds of speakers
- **Routinization** driven by repeated usage activities in usage events
- Operates over **patterns of associations** in the associative networks of individual speakers based on **commonalities of similar usage events**.

More general than the definitions by Langacker (1987: 59) and Bybee (1985: 117).

Bybee, Joan L. (1985). *Morphology: A Study of the Relation between Meaning and Form*, Amsterdam/Philadelphia, PA: Benjamins.
Langacker, Ronald W. (1987). *Foundations of Cognitive Grammar. Vol. I: Theoretical Prerequisites* Stanford, CA.: Stanford University Press.

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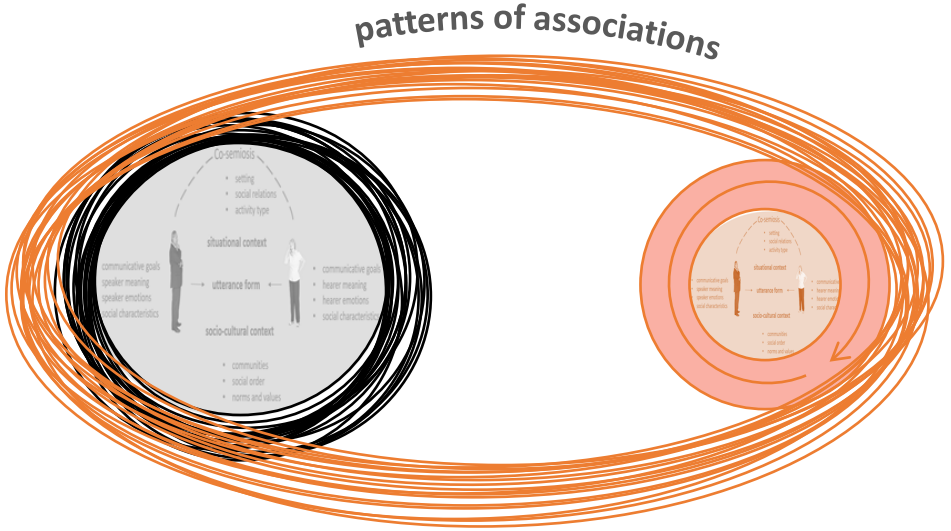

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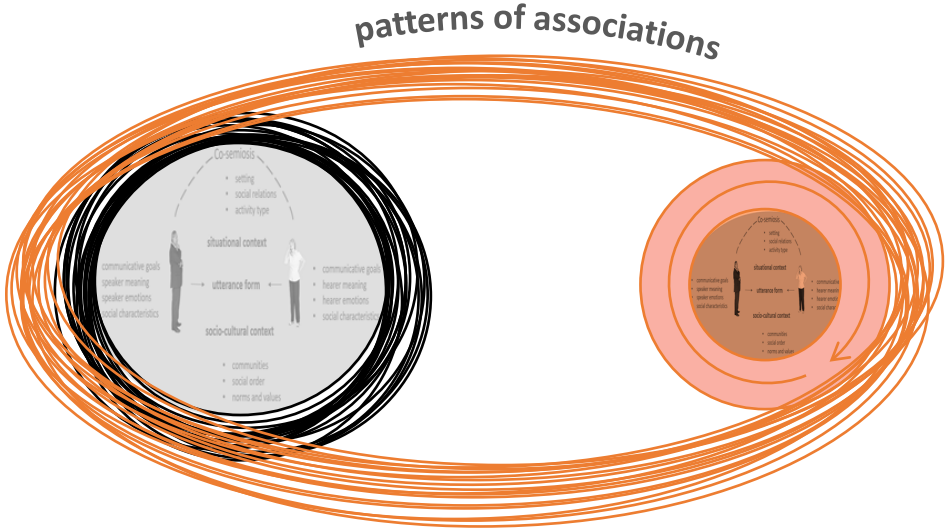

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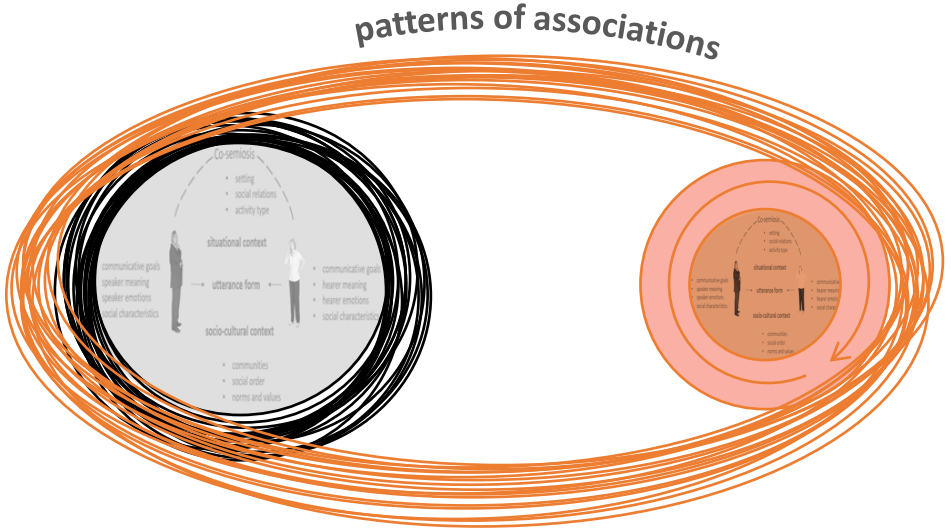
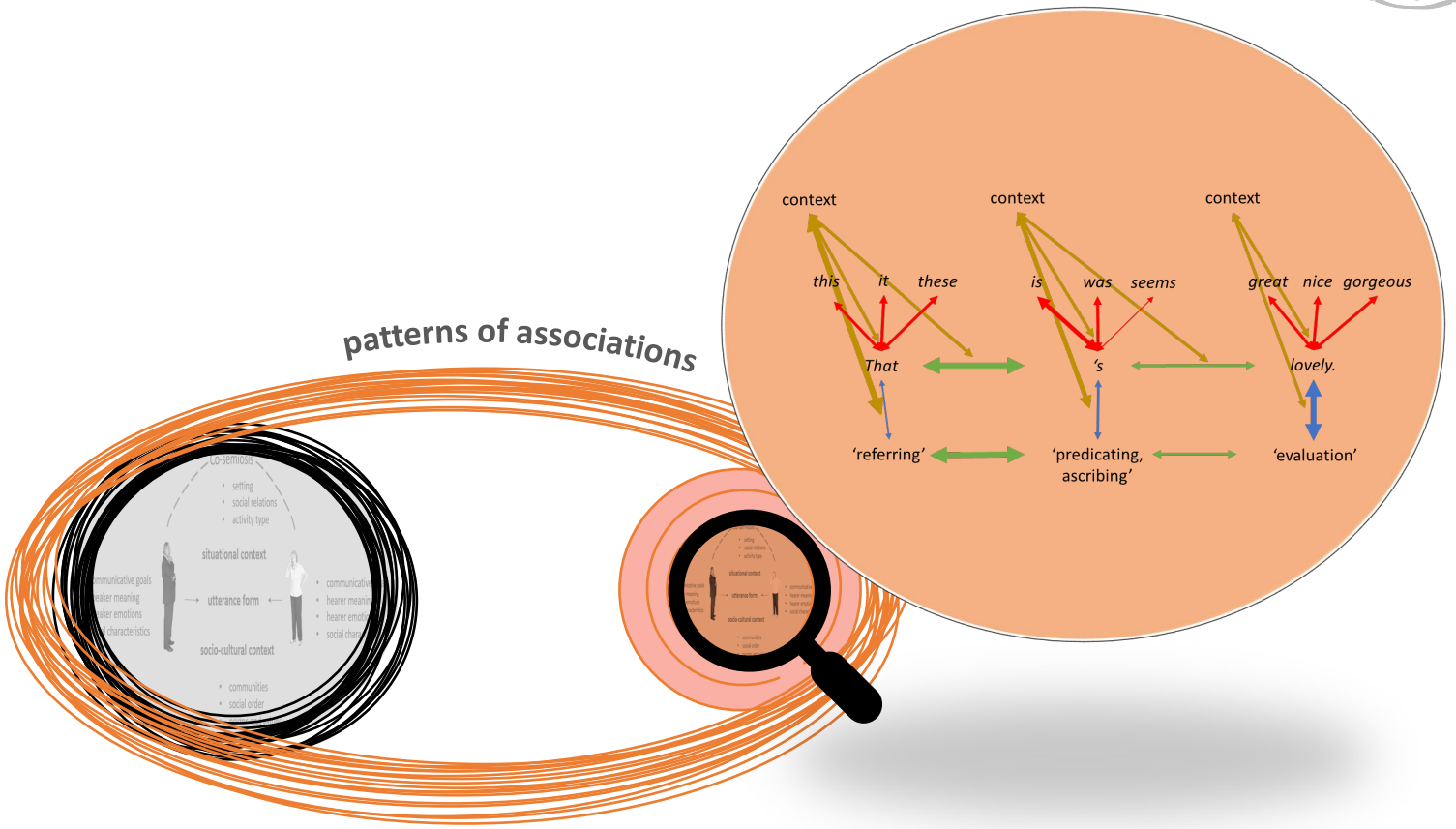


# 8. How does entrenchment work and what is its contribution to linguistic variation?

## What is entrenchment?



# 8. How does entrenchment work and what is its contribution to linguistic variation?

## What are patterns of associations?

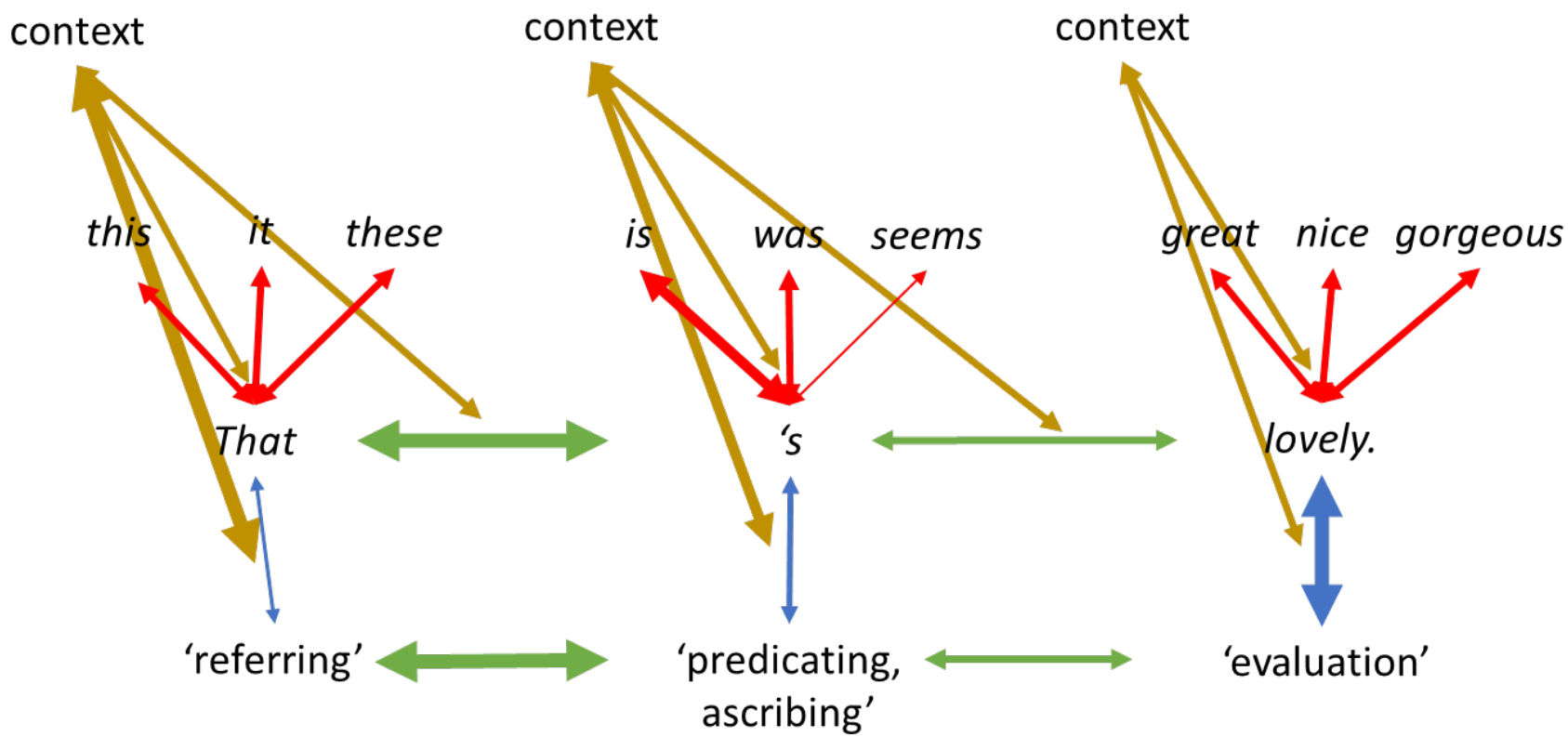
Associations: the ability of "one kind of experience ... to evoke another" (Langacker 2010: 94)

Four types:

- symbolic associations linking forms and meanings and meanings and forms: *true* ⟷ 'in line with reality'
- syntagmatic associations linking sequentially arranged forms and meanings: e.g. *that* → *'s* → *true*
- paradigmatic associations linking competing forms and meanings: e.g. *that's lovely* – *great* – *nice* – *gorgeous* – *cool*
- sociopragmatic associations linking situational and social context to forms: *that's lovely* → S: female, age X-plus

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## What are patterns of associations?



# 8. How does entrenchment work and what is its contribution to linguistic variation?

## How does the entrenchment feedback cycle work?

- Goal: improve the predictive capacity of the associative network required for dealing with linguistic forms, meanings and functions in ongoing production and comprehension

- Means:
  - track usage as greedily as you can
  - detect any regularities of any kind (semasiological, onomasiological, syntagmatic, contextual, social)
  - strengthen associations reflecting these regularities (“routinization”)

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## How does routinization work?

*running* – 'running'
*running* – 'running'
*running* – 'running'
*running* – 'running'
*running* – 'running'
…

*is running*
*was smiling*
*is eating*
*was kissing*
*was helping*
…

RUNNING ↕ 'ongoing fast locomotion'

BE → X-ing ↕ 'ongoing action'

P= home: *runnin*
P= work: *smiling*
P= home: *runnin*
P= home: *drinkin*
P= work: *smiling*
P= work: *runnin*
P= home: *walkin*
P= work: *going*
P= work: *hugging*
P= home: *talking*

V ING/IN

ING ↔ IN

P home: ↔ 20% ING
P work: ↔ 80% ING

RUN → 100% IN

S = John: *runnin*
S = Mary: *smiling*
S = Mary: *runnin*
S = John: *drinkin*
S = Peter: *smiling*
S = Sue: *runnin*
S = Peter: *walkin*
S = Jeff: *going*
S = Jane: *hugging*
S = Sue: *talking*

V ING/IN

ING ↔ IN

$S_{female}$: ↔ 60% ING
$S_{male}$: ↔ 20% ING

RUN → 100% IN

H = John: *runnin*
H = Mary: *smiling*
H = Mary: *runnin*
H = John: *drinkin*
H = Peter: *smiling*
H = Sue: *runnin*
H = Peter: *walkin*
H = Jeff: *going*
H = Jane: *hugging*
H = Sue: *talking*

V ING/IN

ING ↔ IN

$H_{female}$: ↔ 60% ING
$H_{male}$: ↔ 20% ING

RUN → 100% IN

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## Four effects of entrenchment that are relevant for linguistic variation

1. Speakers entrench their own context-dependent linguistic habits and repertoires
2. Speakers entrench social meanings and indexicality of linguistic forms
3. Speakers' entrenched routines include an interpersonal and social component
4. Speakers accommodate ("co-adapt") and entrench variants depending on their indexicality

## 8. How does entrenchment work and what is its contribution to linguistic variation?

### Four effects of entrenchment that are relevant for linguistic variation

1. Speakers entrench their own context-dependent linguistic habits and repertoires

    - Early linguistic socialization, early habits: conditioned by immediate social environment (family)
        - basis for vernacular accents and dialects (e.g. Smith et al. 2013)
    - Puberty, late teens: towards a “peer-based social order” (Eckert 2019), distance from adult mainstream conventions
    - Linguistic socialization driven by institutions:
        - broadening of social and situational repertoires
        - breaks and disentrenchment, depending on external and internal circumstances, e.g. education, mobility, identity
    - Lifelong adaptation and learning

Smith, Jennifer, Mercedes Durham & Hazel Richards. 2013. The social and linguistic in the acquisition of sociolinguistic norms: Caregivers, children, and variation. *Linguistics* 51.285-324.

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## Four effects of entrenchment that are relevant for linguistic variation

1. Speakers entrench their own context-dependent linguistic habits and repertoires

- Speakers habits and routines are entrenched relative to social and situational factors by means of routinized sociopragmatic associations: routines are sensitive to social and situational factors
- Long-term habits perhaps particularly deeply entrenched and stable (Barlow 2013)
- Entrenchment conditioned by the surrounding input and opportunities for output, depending on interactional and social biography, e.g. social networks, communities of practice
- Habits and routines tend to be specific, i.e. lexically and morphological concrete, rather than rules or categories

Barlow, M. (2013). Individual differences and usage-based grammar. *International Journal of Corpus Linguistics*, *18*(4), 443-478.

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## Four effects of entrenchment that are relevant for linguistic variation

### 2. Speakers entrench social meanings and indexicality of linguistic forms


- Social variation: education, occupation, social background, gender
- Stylistic variation: formality of the situation
- Grammatical variation: grammatical function of –ING

[n] ↓
- *going-to* future
- progressive forms (*she was runnin' home*)
- participles (*runnin' home, she …*)
- gerunds (*the switching to metric units*)
- derived nouns (*building, meeting, beginning*)
- derived adjectives (*interesting, fascinating*)

- Spatial variation: [n] widely diffused, but geographical differences regarding the frequency of its use in interaction with the other three factors.
- Plus: individual preferences, effects of frequency, lexical preferences

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## Four effects of entrenchment that are relevant for linguistic variation

2. Speakers entrench social meanings and indexicality of linguistic forms

- Evidence of early learning of constraints on probabilistic variables (e.g. Labov 1989, Chevrot and Foulkes 2013, Smith and Durham 2019)

Chevrot, Jean-Pierre & Paul Foulkes. (2013). Introduction: Language acquisition and sociolinguistic variation. *Linguistics* 51.251-54.
Labov, W. (1989). The child as linguistic historian. *Language Variation and Change*, *1*(1), 85-97.
Smith, Jennifer & Mercedes Durham. (2019). *Sociolinguistic variation in children's language: acquiring community norms*, Cambridge: Cambridge University Press.

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## Four effects of entrenchment that are relevant for linguistic variation

3. Speakers' entrenched routines include an interpersonal and social component

- Speakers are not "idealized native speaker-hearers" in an interactional vacuum
- Speakers' knowledge includes entrenched traces of past co-semiotic activities in context

> "According to our event-related potential results, language comprehension takes very rapid account of the social context, and the construction of meaning based on language alone cannot be separated from the social aspects of language use. The linguistic brain relates the message to the speaker immediately.[...]
>
> The linguistic brain is not just combining words in a context-free semantic universe confined in a single person's skull. It immediately cares about other people."
>
> (Van Berkum et al. 2008: 580, 589)

Van Berkum, J. J., D. van den Brink, C. M. Tesink, M. Kos, and P. Hagoort (2008). 'The Neural Integration of Speaker and Message', Journal of cognitive neuroscience 20(4): 580-91.

## 8. How does entrenchment work and what is its contribution to linguistic variation?

### Four effects of entrenchment that are relevant for linguistic variation

3. Speakers entrenched routines include an interpersonal and social component

- It is not: “Here is what I know about language to produce grammatical sentences”
- But instead: “Here is what I know that I share with what others in my community know and know they share”
- And: “I am aware that my linguistic knowledge only works as long as I can assume that I am in tune with others”
- And: “What we all know (and do when we use language) turns us into a community sharing conventions, norms, rituals”
- Therefore: “When you mess around with my linguistic routines and tell me to change them, then you attack my personal and social identity”

# 8. How does entrenchment work and what is its contribution to linguistic variation?

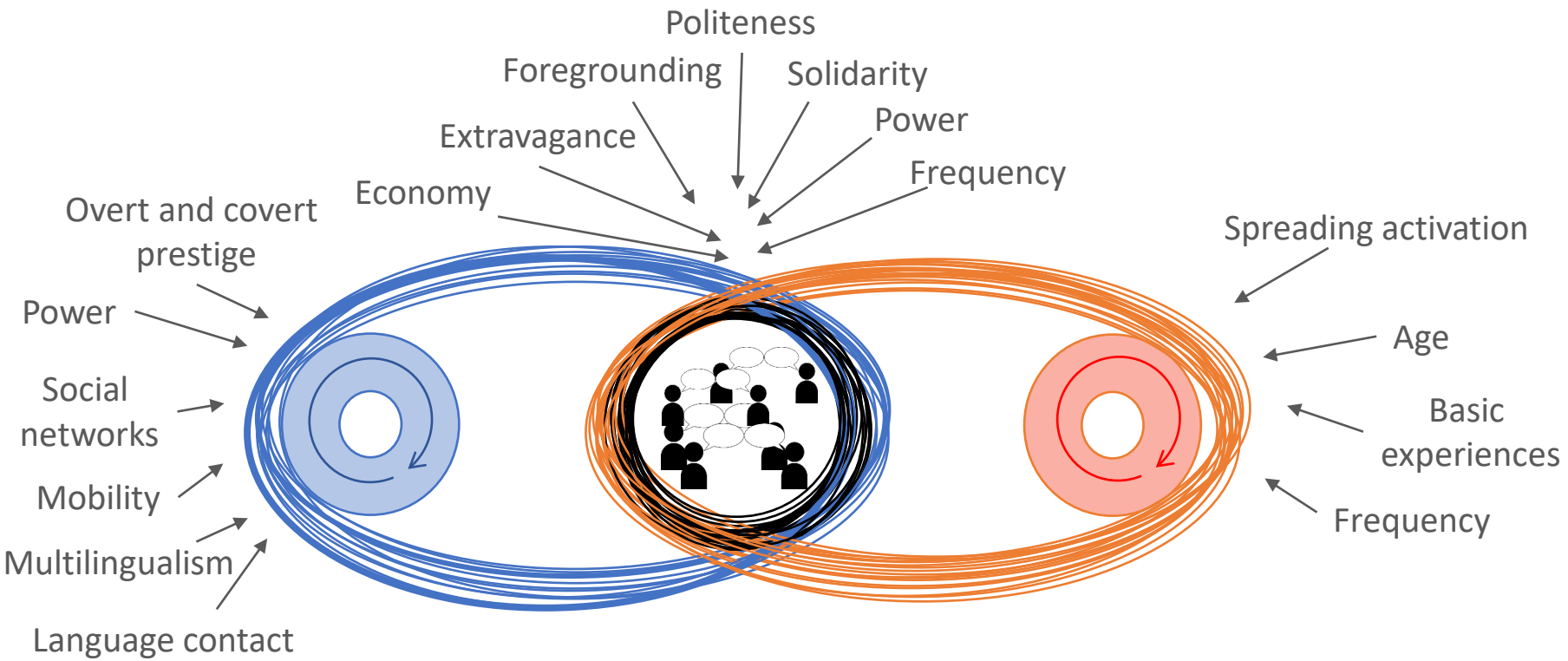
## Four effects of entrenchment that are relevant for linguistic variation

4. Speakers accommodate (“co-adapt”) and entrench variants depending on their indexicality

- effects of stance, affect, subjectivity
- effects of solidarity, group membership, shared identity
- effects of power and prestige

# 8. How does entrenchment work and what is its contribution to linguistic variation?

## Reminder: Many forces affect how the machinery generally works



# 9. Predictions, applications and insights

## Selected predictions

- regional variation
- social variation
- situational variation
- individual differences
- individual speakers' habits partly "conditioned by" social factors and partly by individual factors

## Selected applications

Selected publications that emphasize individual differences, especially in interaction with other variables, e.g.


- Barlow, M. (2013). Individual differences and usage-based grammar. *International Journal of Corpus Linguistics*, *18*(4), 443-478.
- Guy, G. R. (1980). Variation in the group and the individual: The case of final stop deletion. In W. Labov (Ed.), *Locating language in time and space*. New York: Academic Press, 1-36.
- Johnstone, B. (1996). The Linguistic Individual: Self-Expression in Language and Linguistics, Cary: Oxford University Press.
- Johnstone, B. (2014). *Speaking Pittsburghese: The Story of a Dialect,* Oxford: Oxford University Press.
- MacKenzie, L. (2019). Perturbing the community grammar: Individual differences and community-level constraints on sociolinguistic variation. *Glossa: a journal of general linguistics*, *4*(1).
- Walker, J. A., & Meyerhoff, M. (2013). Studies of the community and the individual. In R. Bayley, R. Cameron, & C. Lucas (Eds.), *Oxford Handbook of Sociolinguistics*. Oxford: Oxford University Press, 175-194.
- Sankoff, D. (2005). Variable Rules. In u. Ammon, N. Dittmar & K.J. Mattheier (Eds.), *Sociolinguistics. An international handbook in the science of language and society*, rev. ed., Berlin: Walter de Gruyter, 1150-1163.
- Schmid, H.-J., Würschinger, Q., Fischer, S., & Küchenhoff, H. (2021). *That's Cool.* Computational Sociolinguistic Methods for Investigating Individual Lexico-grammatical Variation. *Frontiers in Artificial Intelligence*, *3*(89).
- Tagliamonte, S. A., & Baayen, R. H. (2012). Models, forests, and trees of York English: *Was*/*were* variation as a case study for statistical practice. *Language Variation and Change*, *24*(2), 135-178.
- van de Velde, H., & van Hout, R. (1998). Dangerous aggregations. A case study of Dutch (n) deletion. In C. Paradis (Ed.), *Papers in sociolinguistics*. Quebec, Nuits Blanches, 137-147.

## Selected applications

van de Velde and van Hout (1998: 137f) on Dutch /n/ deletion

Because of the speaker differences, it turned out to be wrong to collapse or aggregate data over speakers. The basic assumption for such a procedure is violated by the presence of interaction effects between individual speakers and conditioning linguistic factors. This problem is mentioned explicitly by Sankoff (1988:992) and he refers to Rousseau & Sankoff (1978) for an algorithm to group speakers. Kay (1978) pointed out that there are patterns of language change marked by interactions between speakers and conditioning linguistic factors, whereas there is no straightforward community grammar with only one variable rule shared by all speakers.

Nowadays, this discussion has been completely forgotten in variation studies. Standardly, the real speaker is hidden behind dangerous aggregation levels, the assumed absence of linguistic interaction is never tested, and, commonly, too many factors are made part of the analysis. The standard approach in variation studies should be the other way around: there is interaction. Speaker differences and complex variation patterns marked by interaction effects can be studied better when sociolinguists are prepared to use a larger variety of analytic statistical techniques. It is unwise to rely only on variable rule analysis / logistic regression. Using variable rule analysis is not such a self-evident choice as most variationists tend to think and a standard application may even generate results that do not explain the variation patterns at all.

# 9. Predictions, applications and insights

## Selected applications

Tagliamonte and Baayen (2012: 162) on *was/were* variation in York English

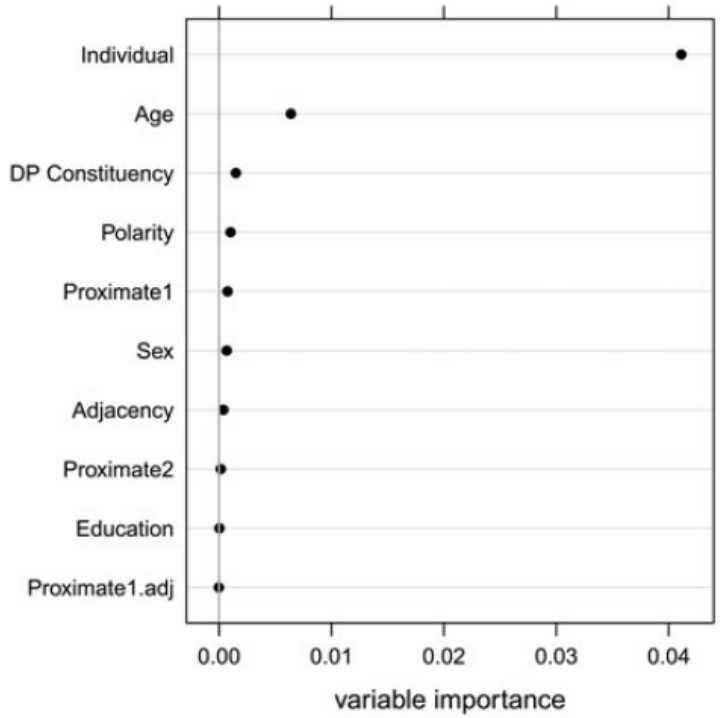



Figure 5 depicts the relative importance of the predictors, using conditional permutation-based variable importance. The gray vertical line highlights the variable importance of the inconsequential predictors, which is for all practical purposes equal to 0.

What Figure 5 shows is that the individual is by far the most important predictor. Substantial variability tied to the individual is also found in almost any psycholinguistic experiment (see, e.g., Baayen, 2008), where a subject random-effect factor invariably accounts for much of the variance. A key advantage of using mixed-effects models for sociolinguistic studies will be the ability to amass a similar foundation of research. Analysts will be able to document the extent and nature of individual variance for linguistic features at all levels of grammar and across speech communities.

## Selected applications

Tagliamonte and Baayen (2012: 165, 169) on *was/were* variation in York English

This example illustrates the more general methodological point, namely, that the effect of categorical and noncategorical individuals should be brought into the analytical exploratory maneuvers of a variationist analysis (Guy, 1980). Are the

Given the overwhelming strength of the **Individual** on variable *was/were,* can we conclude that the story is simply the result of individual variation in York (and perhaps more generally)? There are a number of reasons why this cannot be the primary explanation. Recall that there are pervasive internal constraints involving the contrast between affirmative and negative polarity and an effect of proximity (whether a simple contrast between adjacent/nonadjacent [**Adjacency**] or the influence of a plural element [**Proximate1** or **DP Constituency**]). The new tools we have used here have demonstrated that each of these predictors is statistically significant over and above the effect of **Individual,** depending on the model. Studies that do not bring **Individual** into the model specification not only run the risk of failing to come to grips with an essential source of variation, but they also run the risk of reporting a result as significant that upon closer inspection turns out not to be not significant, in other words, an anticonservative interpretation of results (see, e.g., Baayen, 2008; Baayen et al., 2008).

## Selected applications

Schmid, Würschinger, Fischer and Küchenhoff (2021)
on *that's* Adj, e.g. *that's right, that's good, that's cool*

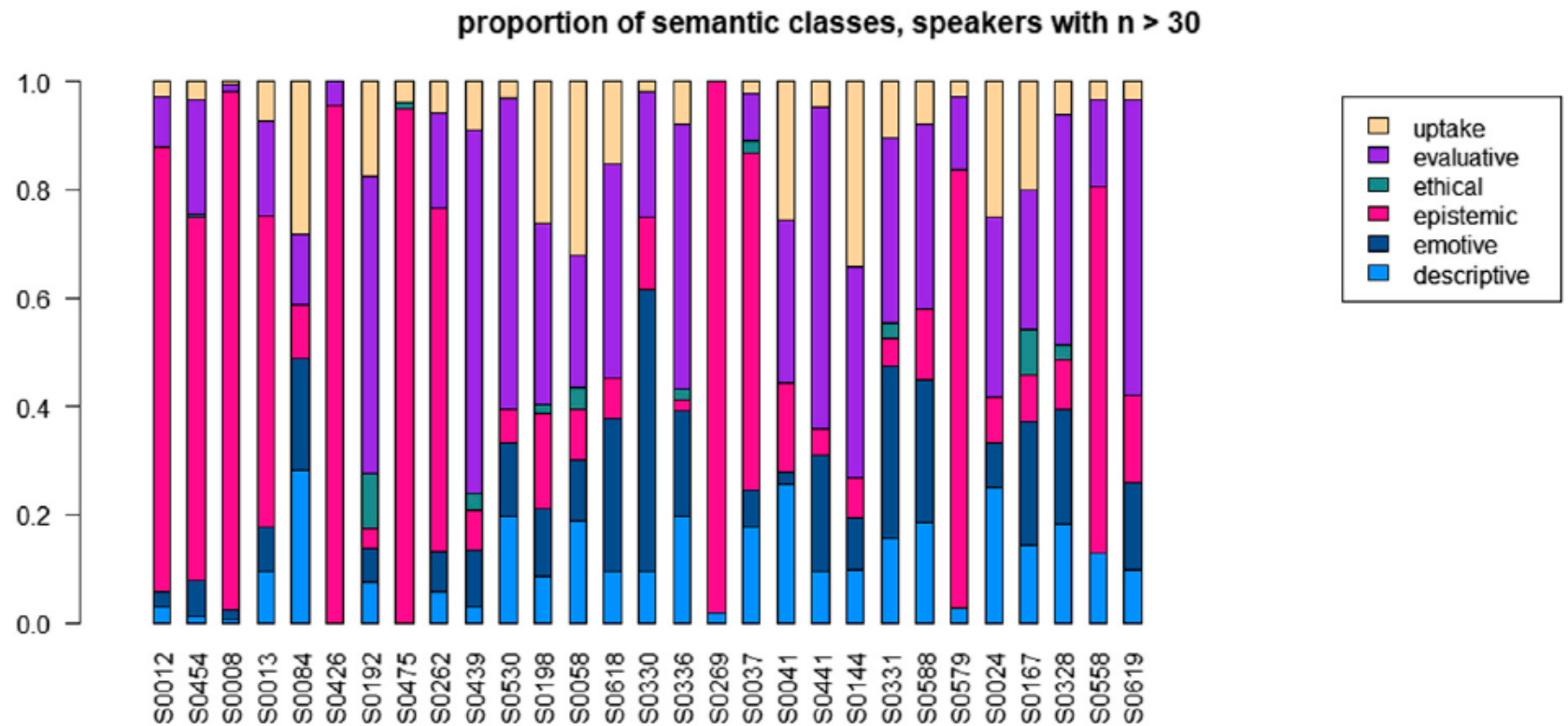
**TABLE 2** | Most frequent adjectives per semantic class.

| Epistemic (all) | n | Evaluative (n > 9) | n | Uptake (all) | n | Emotive (n > 9) | n | Descriptive (n > 9) | n | Ethical (n > 1) | n |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *right* | 1,477 | *good* | 512 | *alright* | 277 | *amazing* | 103 | *weird* | 89 | *fair* | 11 |
| *true* | 350 | *nice* | 199 | *fine* | 224 | *funny* | 79 | *interesting* | 66 | *harsh* | 5 |
| *wrong* | 11 | *cool* | 130 | *okay* | 96 | *ridiculous* | 51 | *crazy* | 57 | *poor* | 4 |
| *correct* | 7 | *brilliant* | 63 | — | — | *awful* | 34 | *different* | 16 | *mean* | 4 |
| *impossible* | 3 | *great* | 58 | — | — | *horrible* | 28 | *strange* | 16 | *nasty* | 3 |
| *incorrect* | 2 | *lovely* | 44 | — | — | *disgusting* | 26 | *clever* | 15 | *naughty* | 3 |
| *exact* | 1 | *terrible* | 39 | — | — | *awesome* | 24 | *cute* | 13 | *unfair* | 2 |
| *definite* | 1 | *bad* | 37 | — | — | *hilarious* | 23 | *mental* | 12 | *scandalous* | 2 |
| *unlikely* | 1 | *incredible* | 15 | — | — | *annoying* | 15 | *pretty* | 12 | *generous* | 2 |
| — | — | *fantastic* | 14 | — | — | *sad* | 12 | *stupid* | 12 | *vile* | 2 |
| — | — | *perfect* | 12 | — | — | *exciting* | 11 | *beautiful* | 11 | — | — |
| — | — | — | — | — | — | — | — | *mad* | 10 | — | — |
| — | — | — | — | — | — | — | — | *easy* | 10 | — | — |

Schmid, Hans-Jörg, Quirin Würschinger, Sebastian Fischer, and Helmut Küchenhoff (2021). '*That's Cool*. Computational Sociolinguistic Methods for Investigating Individual Lexico-Grammatical Variation', *Frontiers in Artificial Intelligence* 3(89).

## Selected applications

Schmid, Würschinger, Fischer and Küchenhoff (2021)
on *that's* Adj, e.g. *that's right, that's good, that's cool*



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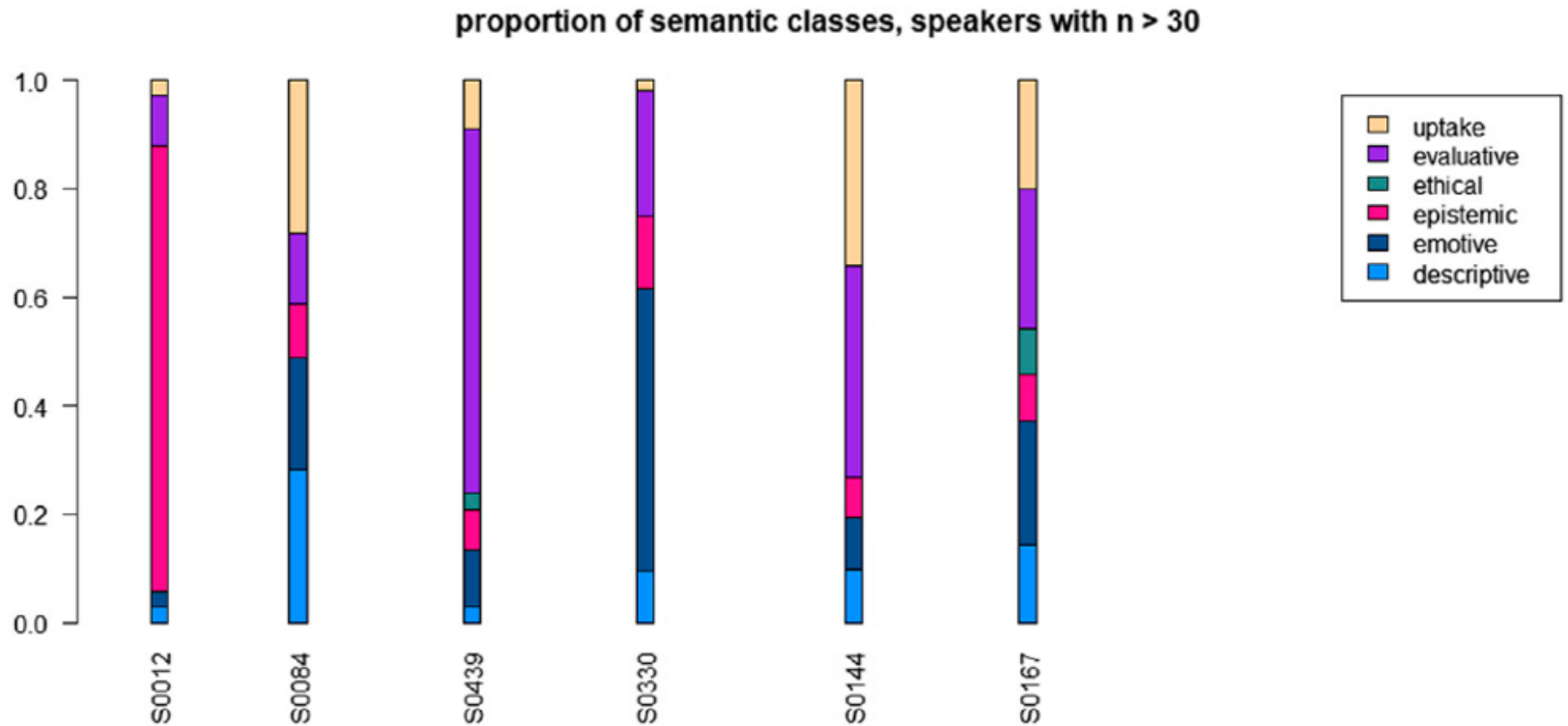
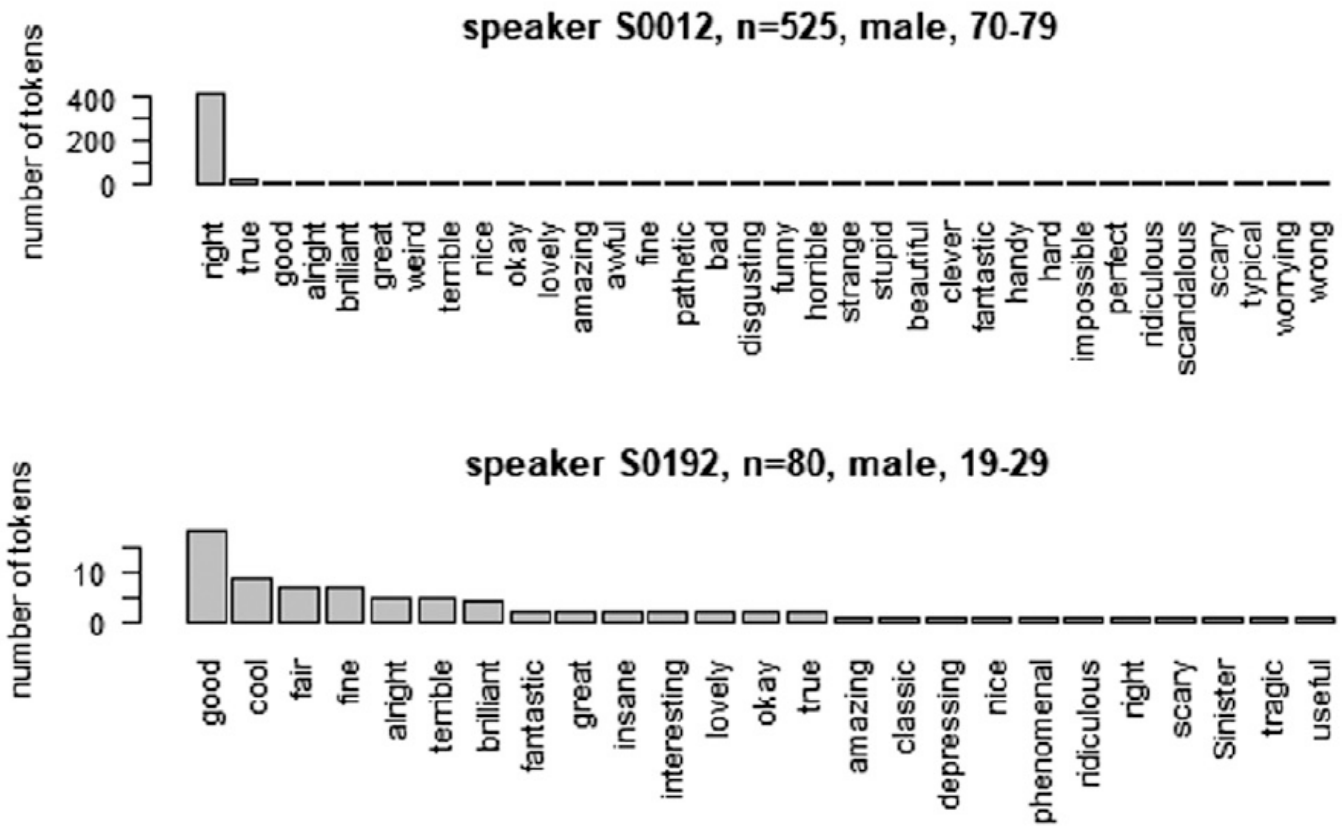


## Selected applications

Schmid, Würschinger, Fischer and Küchenhoff (2021)
on *that's* Adj, e.g. *that's right, that's good, that's cool*

The individual

Corpus data by individual speakers



## Selected applications

Schmid, Würschinger, Fischer and Küchenhoff (2021)
on *that's* Adj, e.g. *that's right, that's good, that's cool*

Inferential statistics (binomial logistic mixed-effects regression models, R (4.0.2), `glmer, lme4` package (1.1-23)

Random effects of CONVERSATION and SPEAKER on the choice of selected adjectives

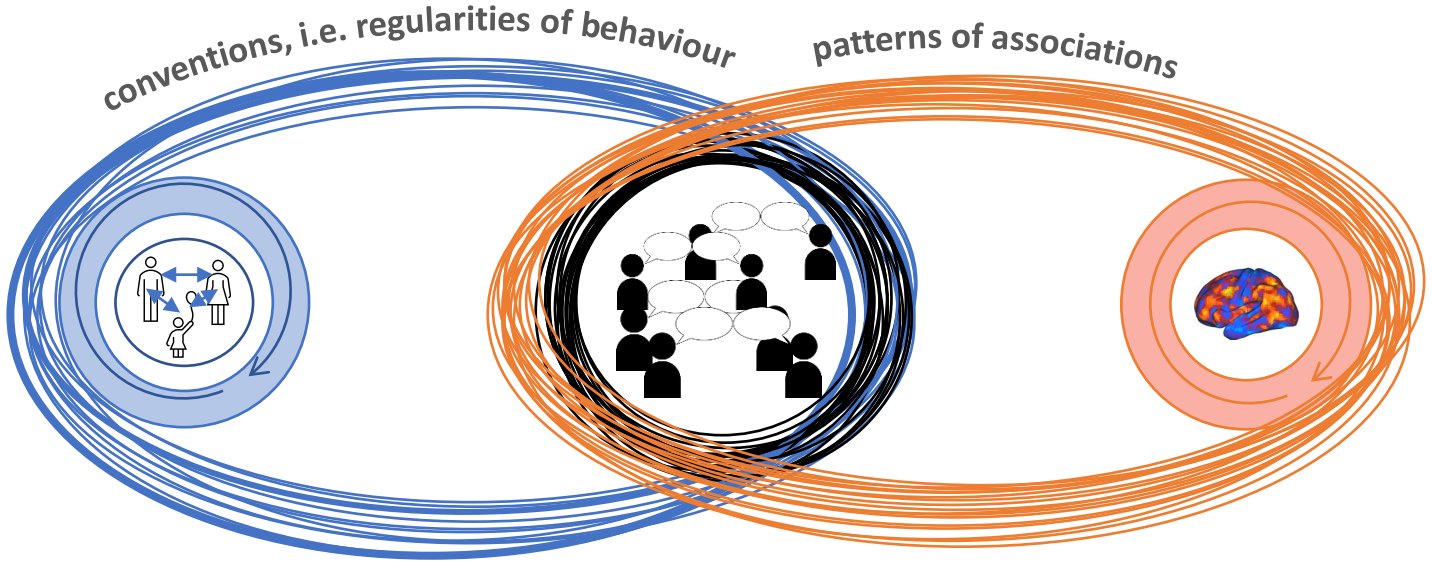
| Adjective | Significant fixed effects (estimate, significance level) | Random effects (standard deviation) | ICCs |
|---|---|---|---|
| *right* | Compared to all other epistemic adjectives meaning "true, correct" | | |
| | AGE [30_49]: 2.85* | CONVERSATION: 1.22 | 15% |
| | AGE [50_69]: 4.51*** | SPEAKER: 2.24 | 51% |
| | AGE [70_99]: 6.50*** | | |
| *good* | Compared to all other positive evaluative adjectives | | |
| | — | CONVERSATION: 0.41 | 4% |
| | — | SPEAKER: 0.66 | 11% |
| *fine* | Compared to all adjectives | | |
| | AGE [70_99]: -1.38* | CONVERSATION: 0.84 | 13% |
| | | SPEAKER: 1.15 | 25% |

## Connecting the social and the cognitive

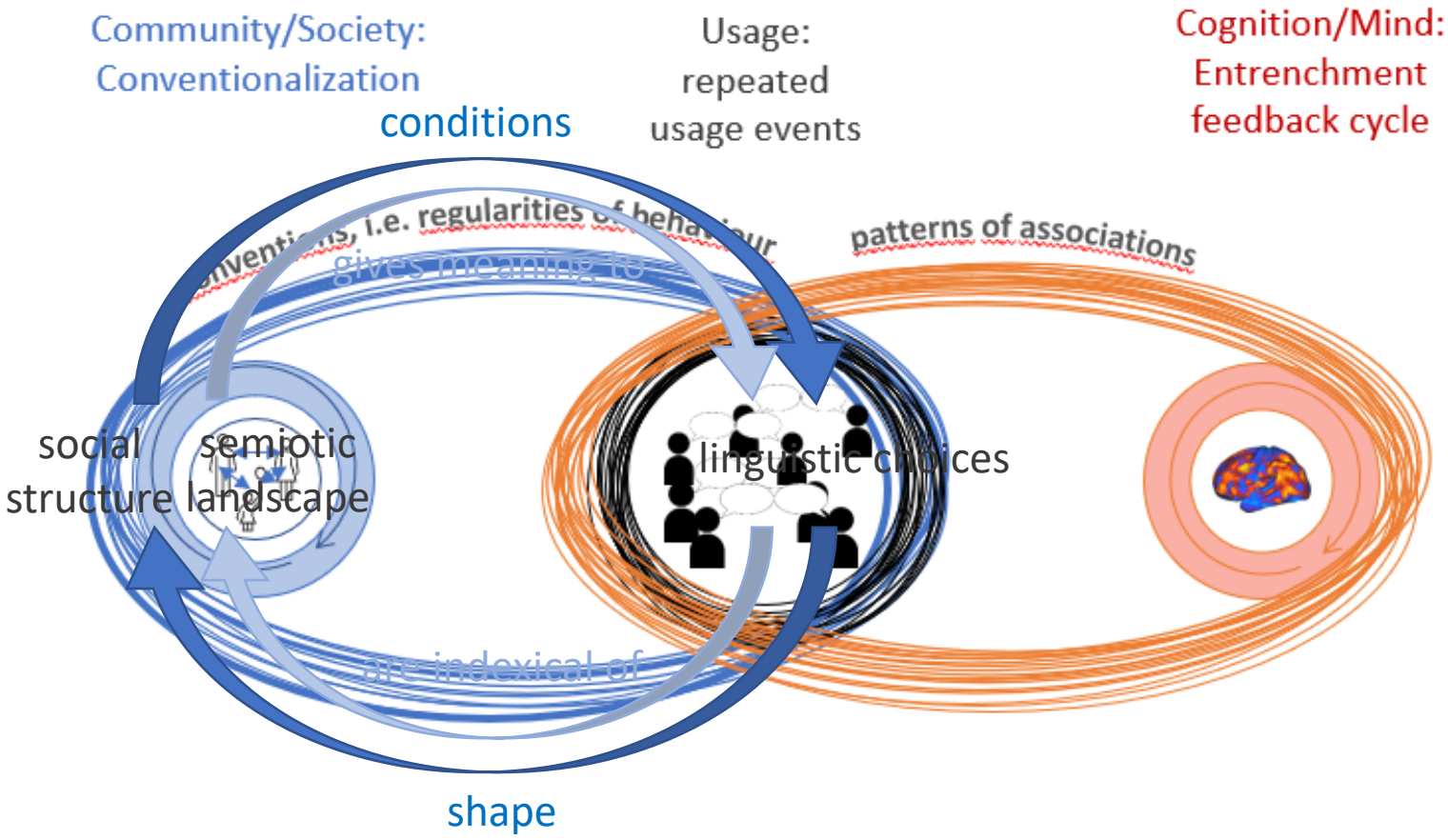
Community/Society:
Conventionalization

Usage:
repeated
usage events

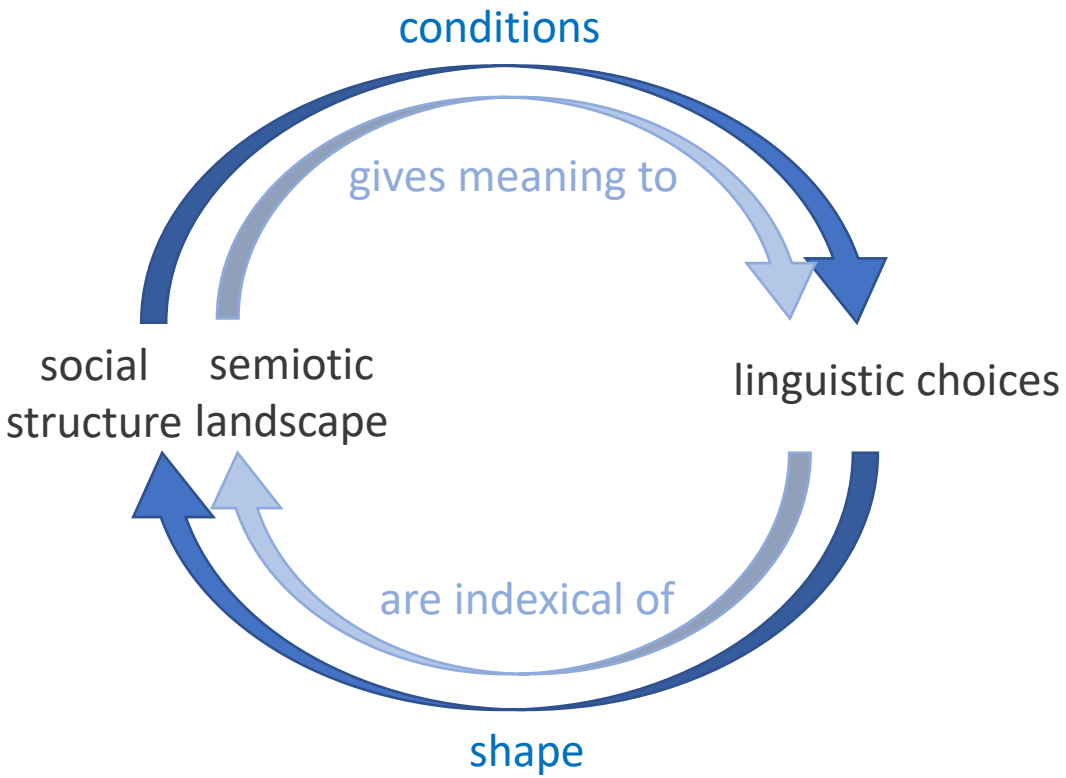
Cognition/Mind:
Entrenchment
feedback cycle



## Connecting the social and the cognitive

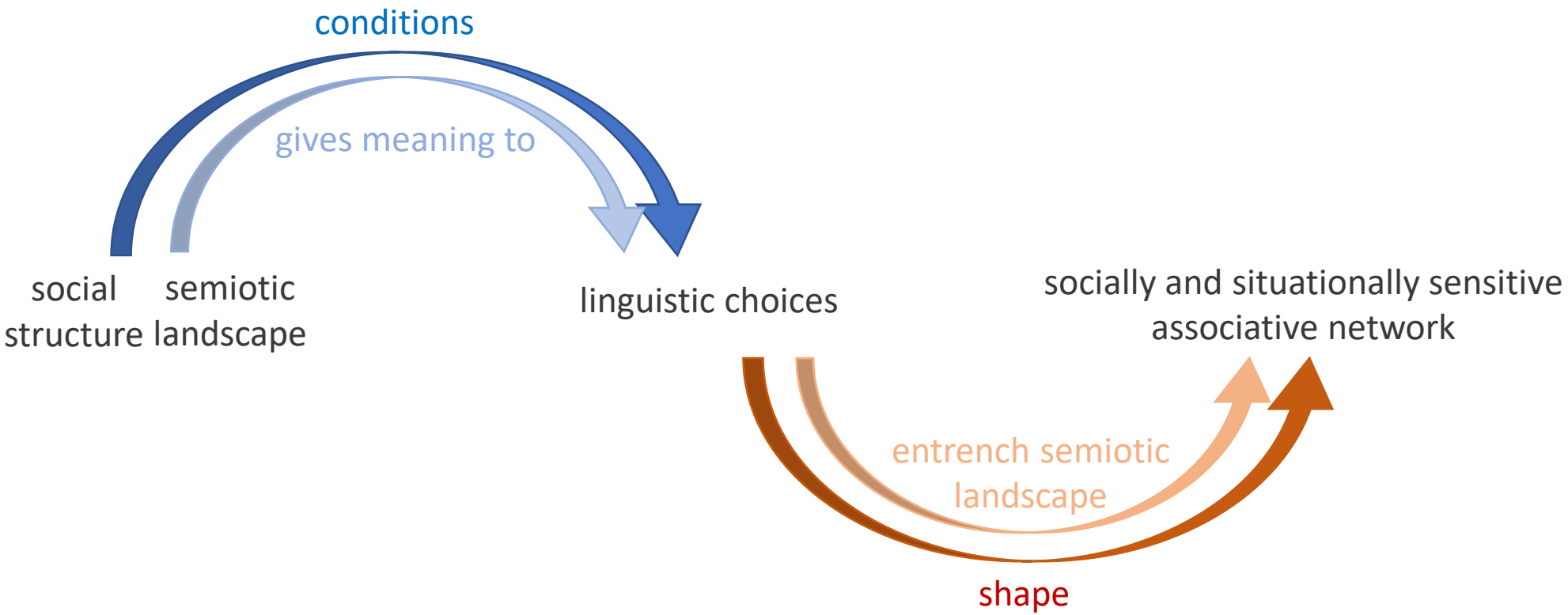


## Connecting the social and the cognitive




???

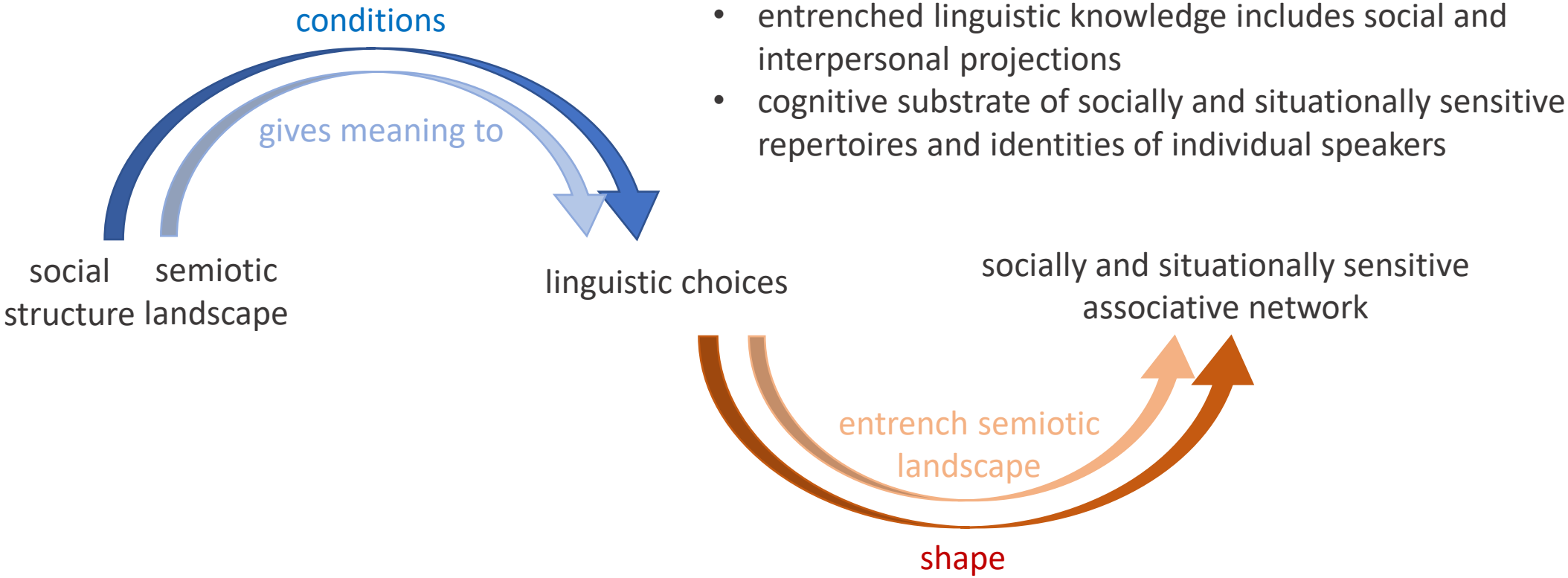
## Connecting the social and the cognitive



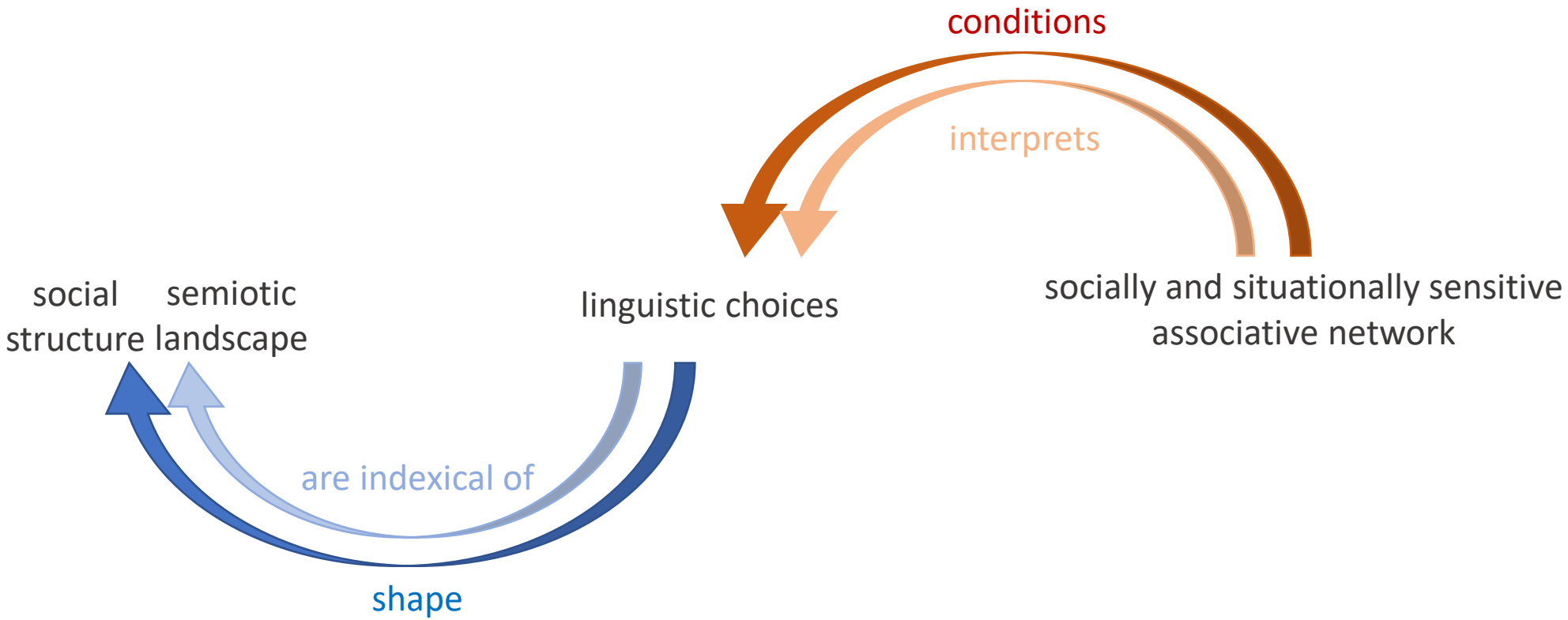
## Connecting the social and the cognitive

Usage feeds the social-semiotic landscape into the associative networks of individuals

- entrenched linguistic knowledge (patterns of associations) is conditioned by social environment
- entrenched linguistic knowledge includes social and interpersonal projections
- cognitive substrate of socially and situationally sensitive repertoires and identities of individual speakers



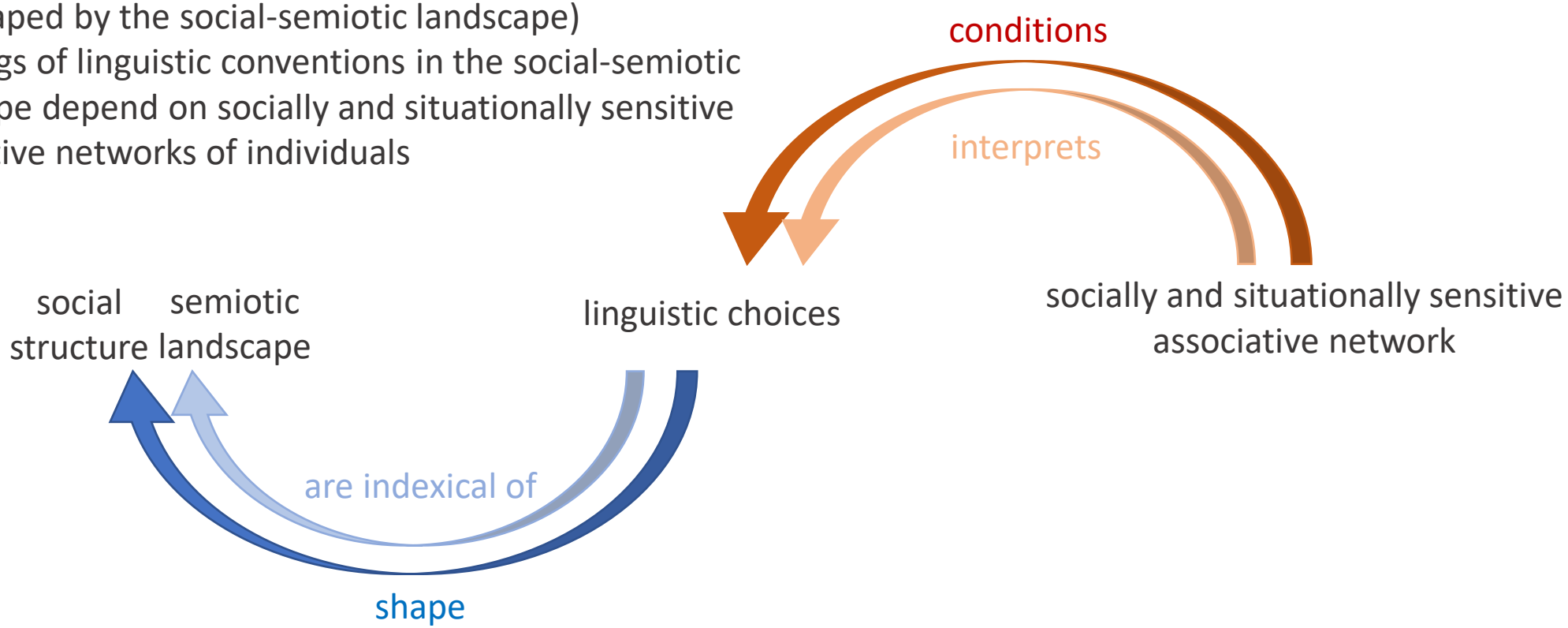
## Connecting the social and the cognitive



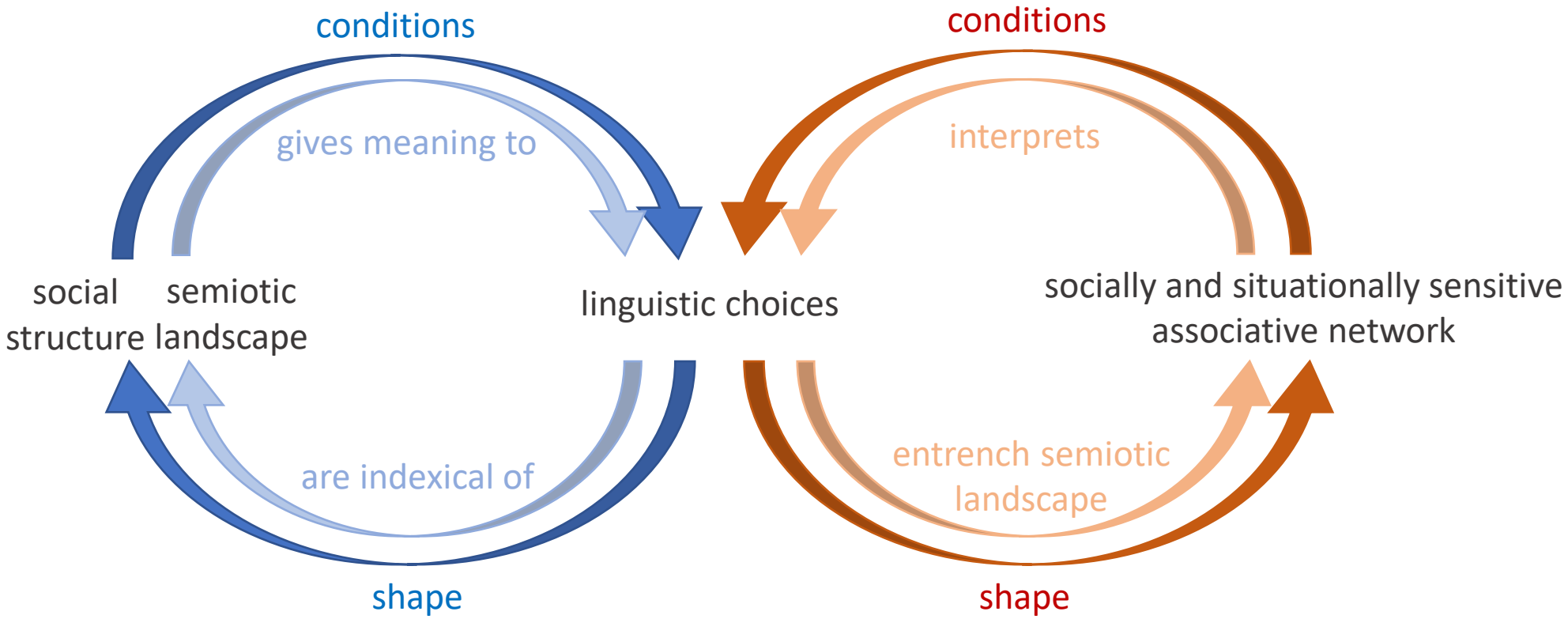
## Connecting the social and the cognitive

Usage feeds entrenched habits into conventions

- linguistic conventions in the social-semiotic landscape are shaped by situation-dependent habits of individuals (in turn shaped by the social-semiotic landscape)
- meanings of linguistic conventions in the social-semiotic landscape depend on socially and situationally sensitive associative networks of individuals



## Connecting the social and the cognitive



# 10. Social and cognitive underpinnings of linguistic variation

## Connecting the social and the cognitive

- All types of linguistics variation are ultimately subserved by commonalities and differences

    - of speakers' routines (and some occasions of non-routinized behaviour), which are

        - dependent on situations

        - and set against the social-semiotic landscape of conventions

            → linguistic variation is both represented in the individual and grounded in the conventionalized social-semiotic landscape of a group, community, society

## Connecting the social and the cognitive

- Variation is “orderly” to the extent that shared individual routines can be correlated with use-related and user-related parameters in the social-semiotic landscape,

    - due to shared linguistic experience in communities and recurrent situations (the conventionalization feedback cycle),

    - serving as the community-specific social-semiotic landscape for giving meaning to our linguistic repertoires and repertoires of identities,

    - and perpetuating these identities by way of the double feedback loop mechanism

## Connecting the social and the cognitive

- On top of that, however, there is a considerable residuum of ‘purely’ individual habits, which tend to be formally specific rather than abstract and categorical, e.g.
    - specific interactions between social and situational variables and individuals on all levels of variation
    - specific lexical effects (e.g. driven by individual frequency) rather than systematic variation of phonological and morphosyntactic categories/variables
    - specific contexts effects on all linguistic levels of variations, driven by context-dependent habits, whims, ticks

## 11. Conclusion: possible advantages of the overall approach


- Show how the social and the cognitive are linked by usage

- Model both in such a way that they are inherently

    - dynamic
    - flexible
    - mutually dependent
    - variable, partly “orderly” and partly less so
    - open for creativity and innovation

- Entails a dynamic view of repertoires and varieties, which is helpful for explaining

    - variability within varieties
    - endangered traditional varieties
    - emerging new varieties
    - eclectic and dynamic manner of exploiting linguistic variables for conveying social meanings

- Entails a dynamic view of language and language change as well as the role of individuals in change,

    - but that’s a different story you don’t want to hear today …