Mark my words!
Linguistic style coordination in social media

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Non-conscious coordination

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Small scale, laboratory controlled studies.

Linguistic style coordination

Linguistic style:

> **How** things are said as opposed to **what** is said

Linguistic style coordination

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Example:

Q : "At what time does your shop close?"

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Linguistic style coordination

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Linguistic style coordination

Linguistic style:

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Example:

Q1: "At what time does your shop close?"

Q2: "What time does your shop close?"

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[Levelt & Kelter, 1982]

Linguistic style coordination

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[Levelt & Kelter, 1982]

Linguistic style coordination

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[Levelt & Kelter, 1982]

Linguistic style coordination

Linguistic coordination occurs:

instantaneously

non-consciously

Talk outline

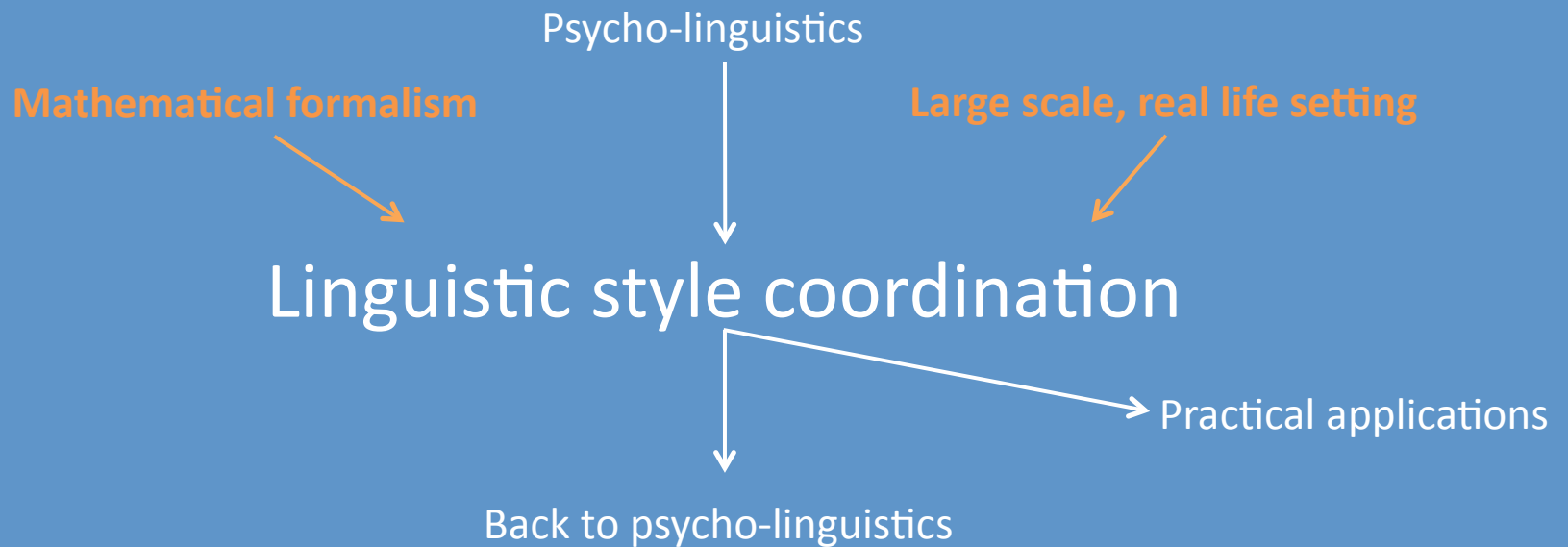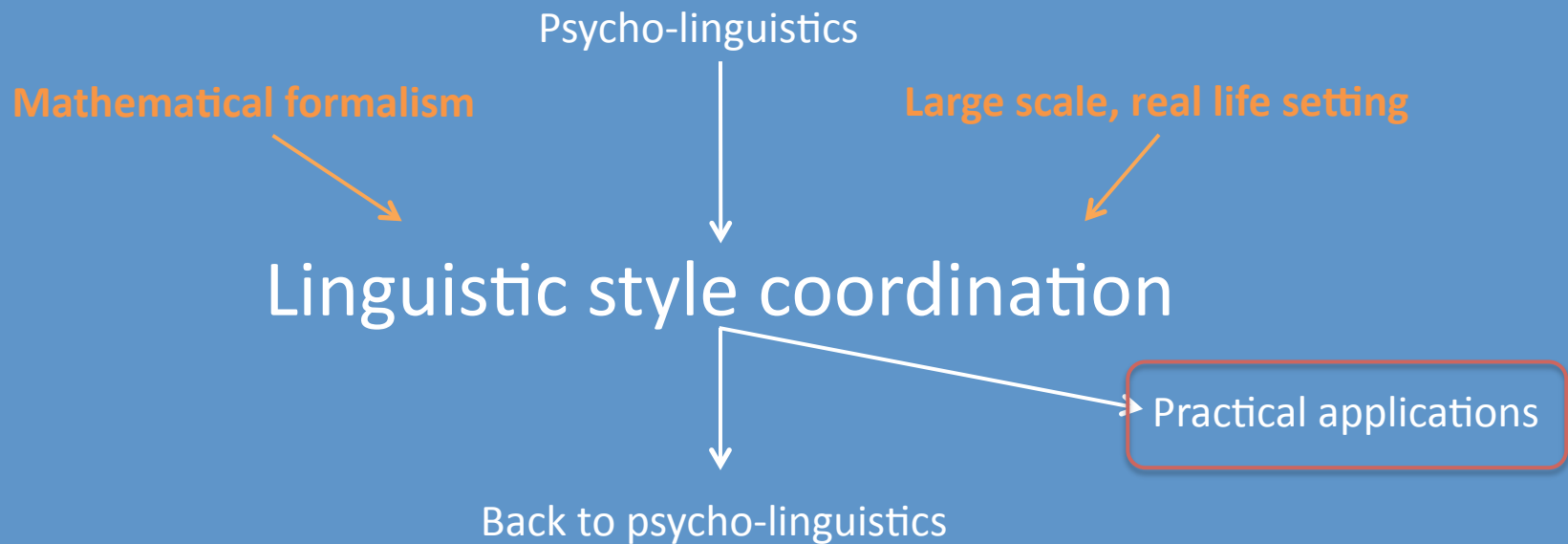Psycho-linguistics

↓

Linguistic style coordination

Talk outline
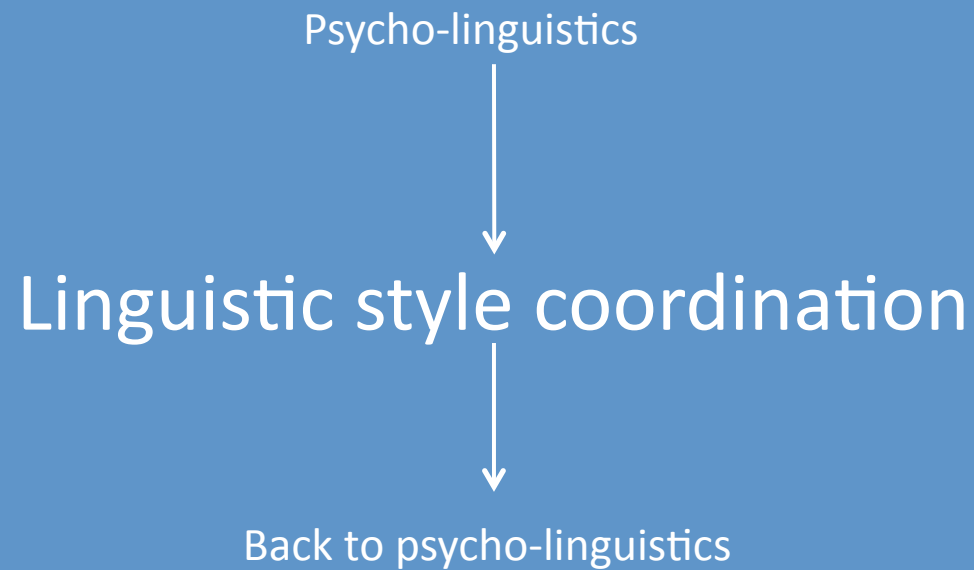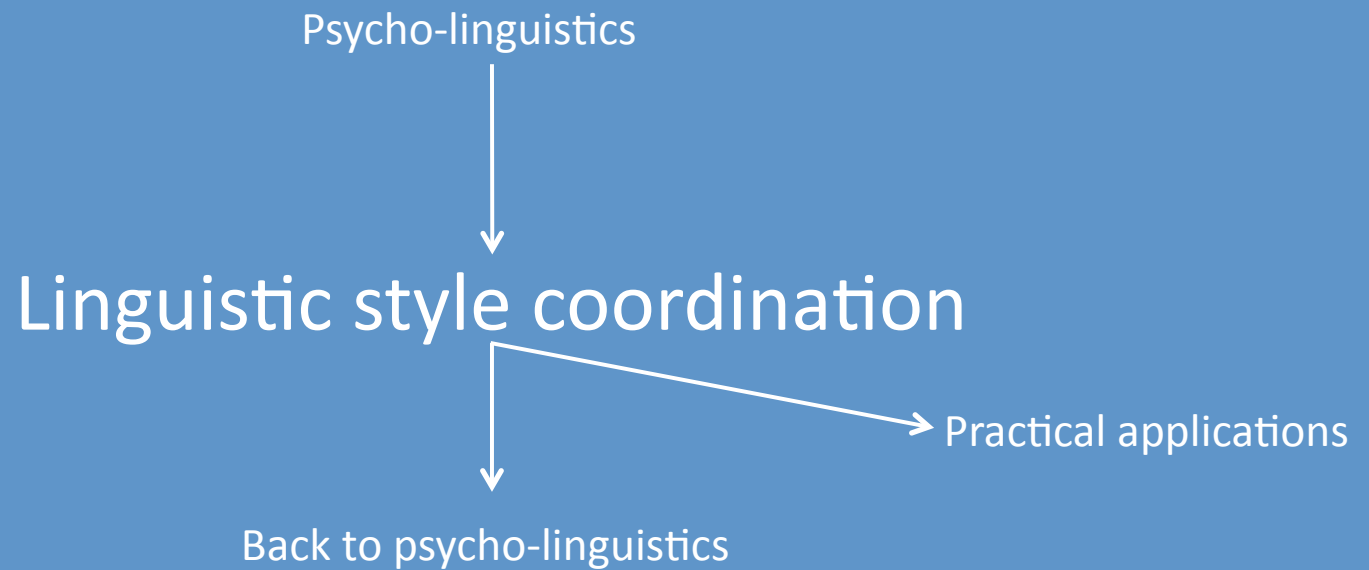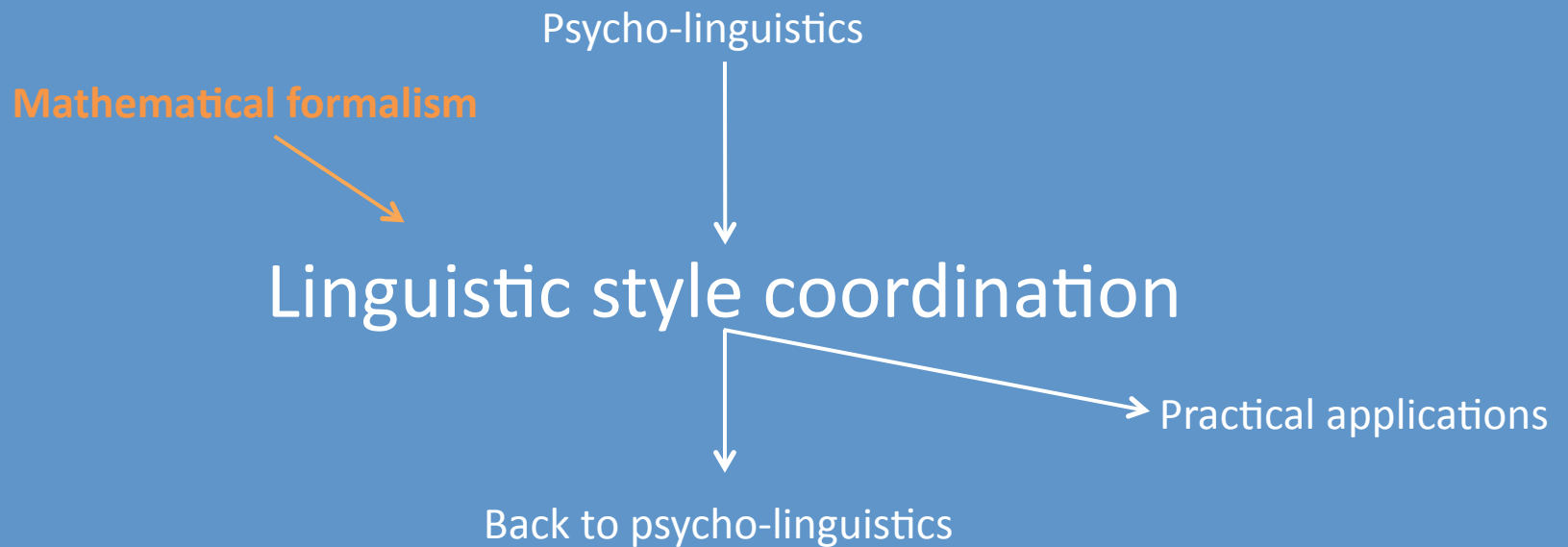
Psycho-linguistics

Linguistic style coordination

Back to psycho-linguistics

Talk outline

Psycho-linguistics

Linguistic style coordination

Practical applications

Back to psycho-linguistics

Talk outline

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Mathematical formalism

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Large scale, real life setting

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Practical applications

Why bother?

Premise: Coordination has a positive effect on communication

[Giles et al, 2006]

Previously explored applications:
- Hostage negotiations [Taylor & Thomas, 2008]
- Treatment of mental disability [Hamilton, 1991]
- Psychotherapy [Ferrara, 1991]

Practical applications

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- **Bigger tips!** [Van Baaren et al, 2003]
  - when waitresses coordinate with the customers they get bigger tips

Practical applications

Why bother?

Premise: Coordination has a positive effect on communication

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By adding:
- Robustness (beyond small-scale, real-time, face-to-face etc.)
- Framework for working with coordination at a large-scale

we could use coordination for:
- Automated dialogue systems
- Detection of forged or unnatural conversations

Psycho-linguistics

Mathematical formalism

Large scale, real life setting

Linguistic style coordination

Practical applications

Back to psycho-linguistics
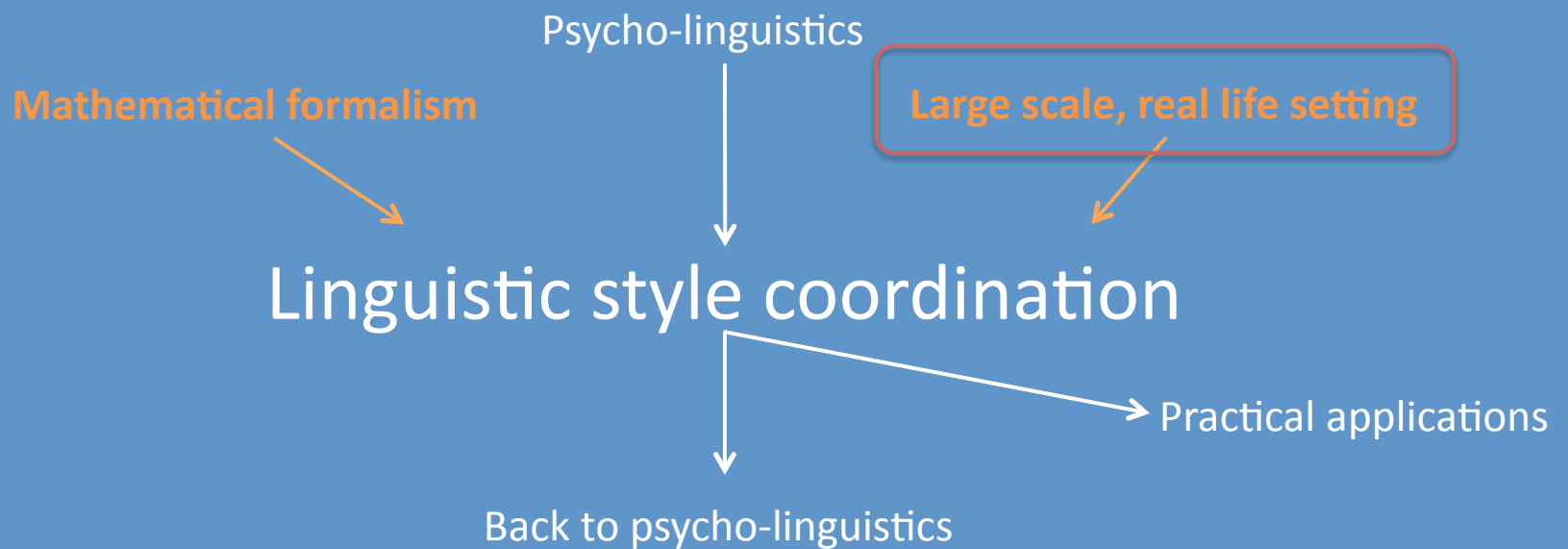
Coordination on Twitter

Twitter conversations: a new opportunity

- Large scale and naturally occurring
    - ~37% of all tweets are conversational [Kelly, 2009]

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    - 140 character restriction
    - wide spectrum of relation development stages
      (vs. inception-stage only in laboratory studies)

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Twitter conversations: a new opportunity / challenge

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Is the phenomenon robust enough to emerge under these constraints?

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Back to psycho-linguistics

Measuring linguistic style

Pleased that the Senate has confirmed Elena Kagan as our 112th Supreme Ct. justice. I am confident she will make an outstanding justice.

about 22 hours ago via HootSuite

BarackObama
Barack Obama

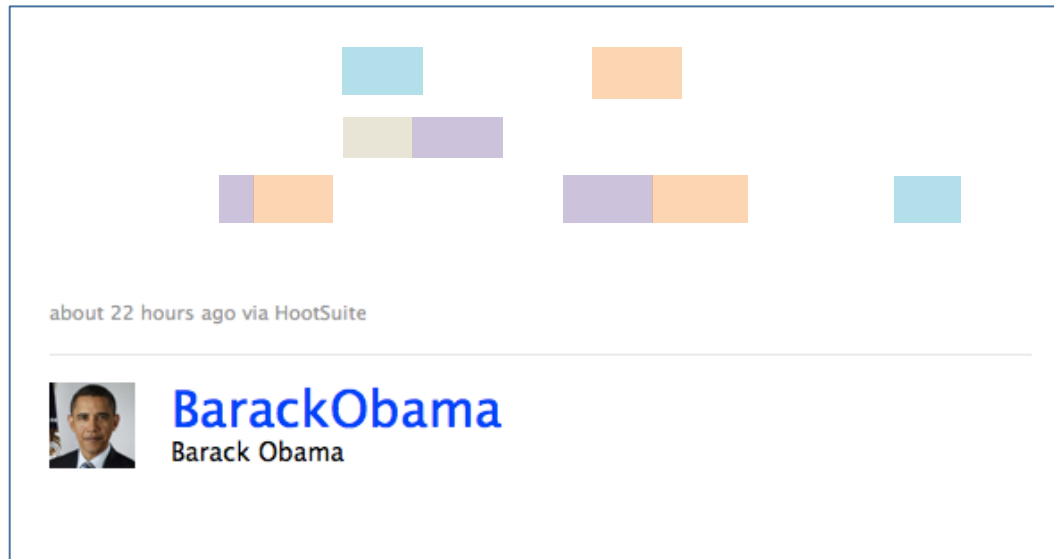congrats 2 landon donovan 4 scorin game winning goal. grt job but u ain't scoring on me in shaq vs! good luck nxt round go usa
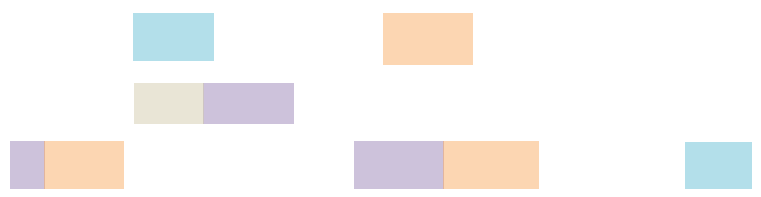
10:18 AM Jun 23rd via Twitter for iPhone

THE_REAL_SHAQ

Measuring linguistic style

A methodology borrowed from psycho-linguistics (LIWC):

[Pennebaker et al., 2001]

Feature families	Examples
Prepositions	at, to, with
Articles	the, an, a
Auxiliary verbs	maybe, perhaps
Conjunctions	and, whereas
…	…

9 feature families
~450 lexemes

Functional words, deemed by [Ireland et al., 2010] to be:
- Unrelated to topic
- Generated and processed non-consciously

(all results hold for all the 50 feature families we studied)

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What we don't want: how similar *A*'s style is to *B*'s style (e.g., effect of homophily)

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$$Coordination_{(B \; to \; A)}(art.) \;\; = \;\; P(B^{art.} | B \text{ replied to } A, A^{art})$$

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$$Coordination_{(B\ to\ A)}(art.) = P(B^{art.}|B \text{ replied to } A, A^{art})$$

$$- P(B^{art.}|B \text{ replied to } A)$$

Baseline: controls for inherent similarity

Measuring coordination

Overall coordination: average over all pairs of users (B,A)

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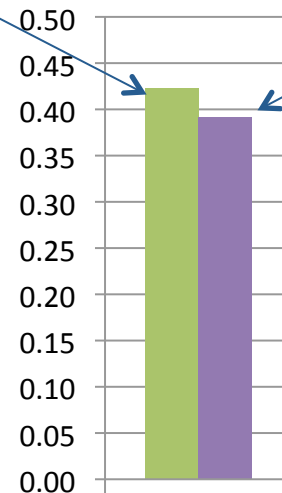
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Article

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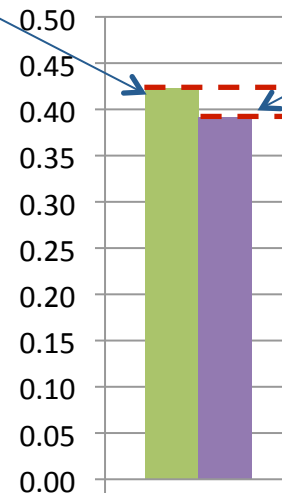
Coordination

Article

Empirical validation

Complete Twitter conversational history

for 2,200 pairs of users

215,000 conversations

Average of 100 conversations/pair

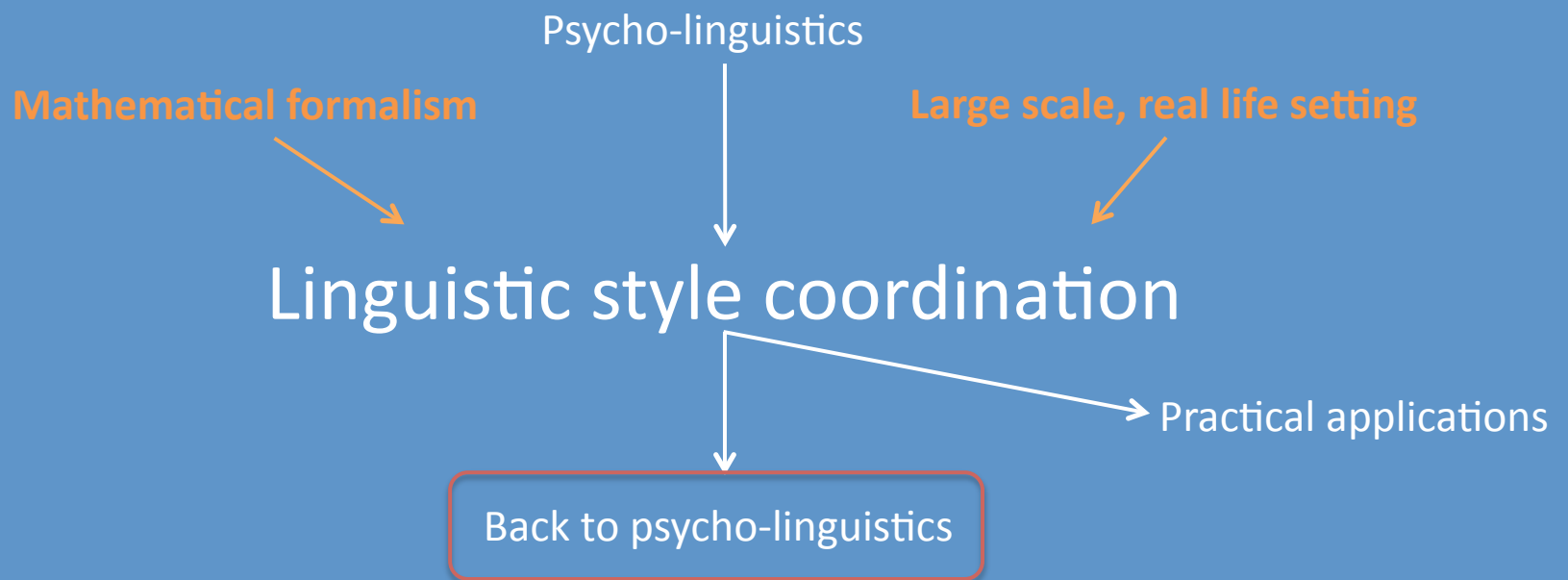held over an average of 270 days

Empirical validation

Statistically significant (p<0.0001) effect of coordination
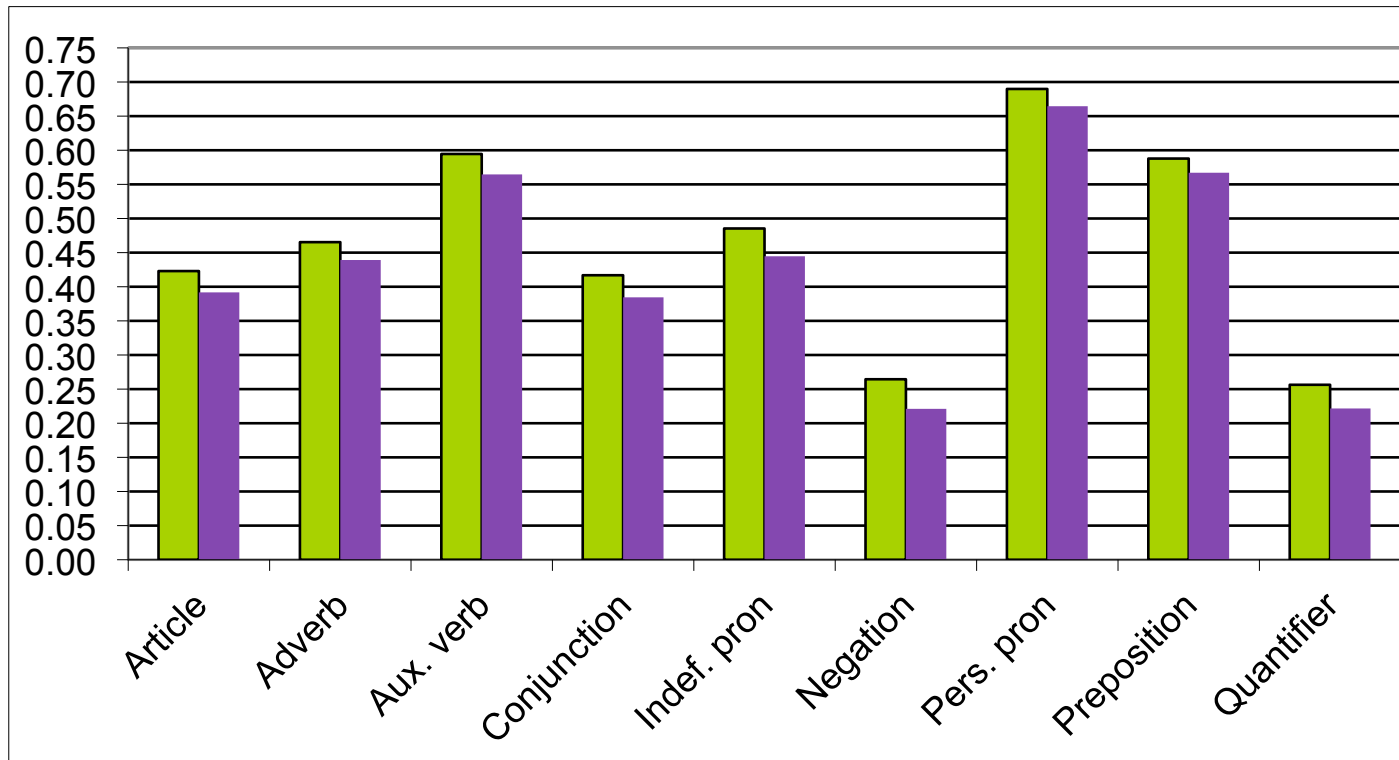
Empirical validation

The first time coordination is shown to occur in a large-scale, real-life setting!
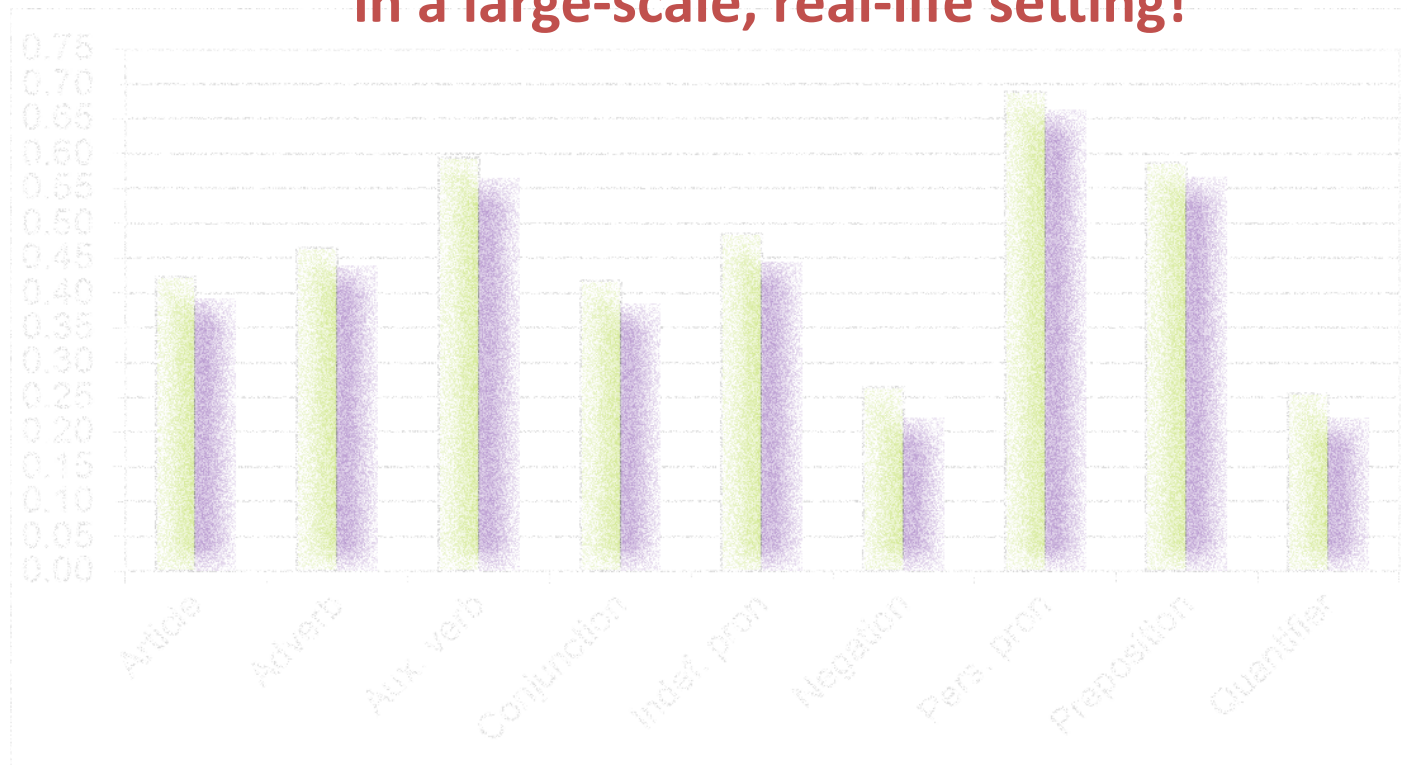
Psycho-linguistics

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Back to psycho-linguistics

Stylistic influence

Given two people, one can impose her style on the other more than vice-versa.

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A statistically significant imbalance between users is prevalent in Twitter.

➢ revealing a complexity of the phenomenon never observed before
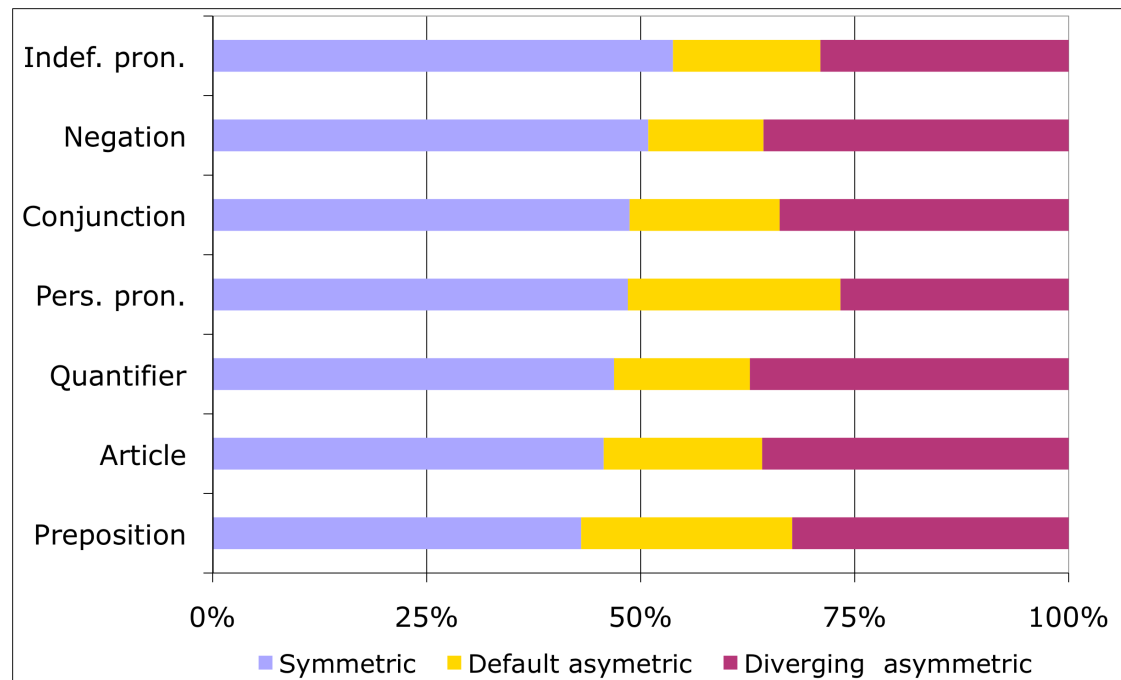
Stylistic influence

Is coordination symmetric?

Stylistic influence

- Symmetric: $Coordination_{(B\ to\ A)}(F) > 0$ & $Coordination_{(A\ to\ B)}(F) > 0$

- Asymmetric:
  - Default: $Coordination_{(B\ to\ A)}(F) > 0$ & $Coordination_{(A\ to\ B)}(F) = 0$
  - Diverging: $Coordination_{(B\ to\ A)}(F) > 0$ & $Coordination_{(A\ to\ B)}(F) < 0$

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Stylistic influence

What type of people have more stylistic influence?

Stylistic influence

What type of people have more stylistic influence?

case study: gender (of movie characters)

Stylistic influence and gender

Movie scripts conversation dataset
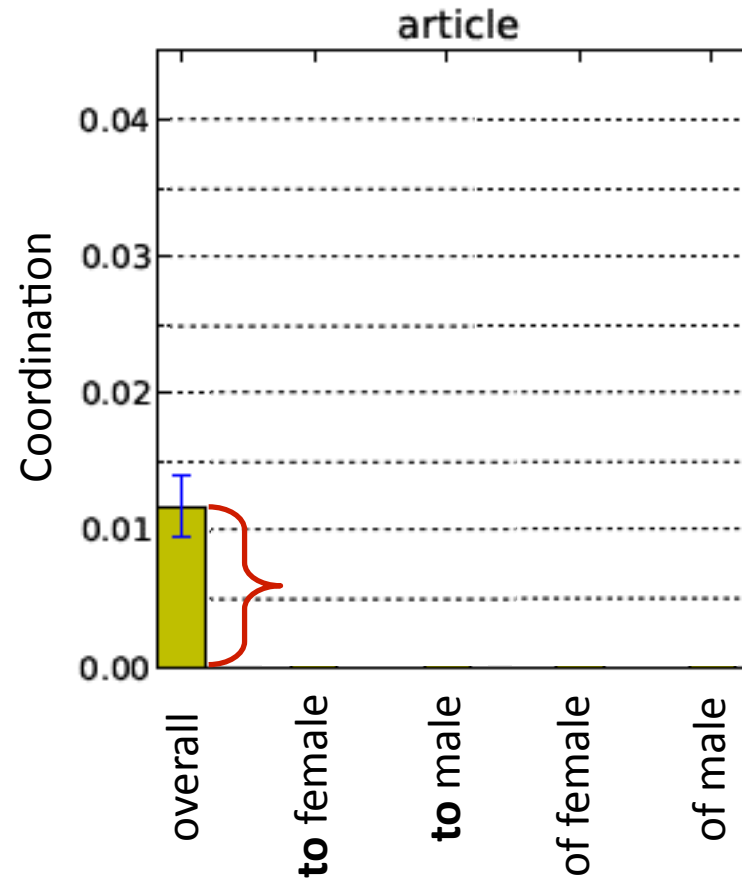
220,000 conversations

617 movies

between 9000 characters
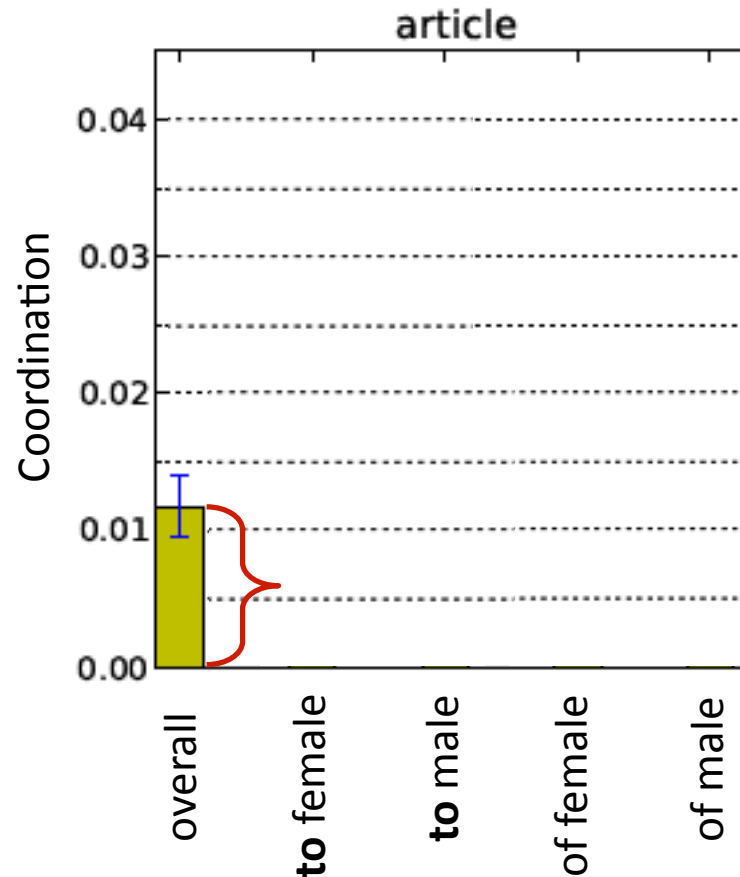
with known gender!

[with Lillian Lee, forthcoming]

Movie characters coordinate!

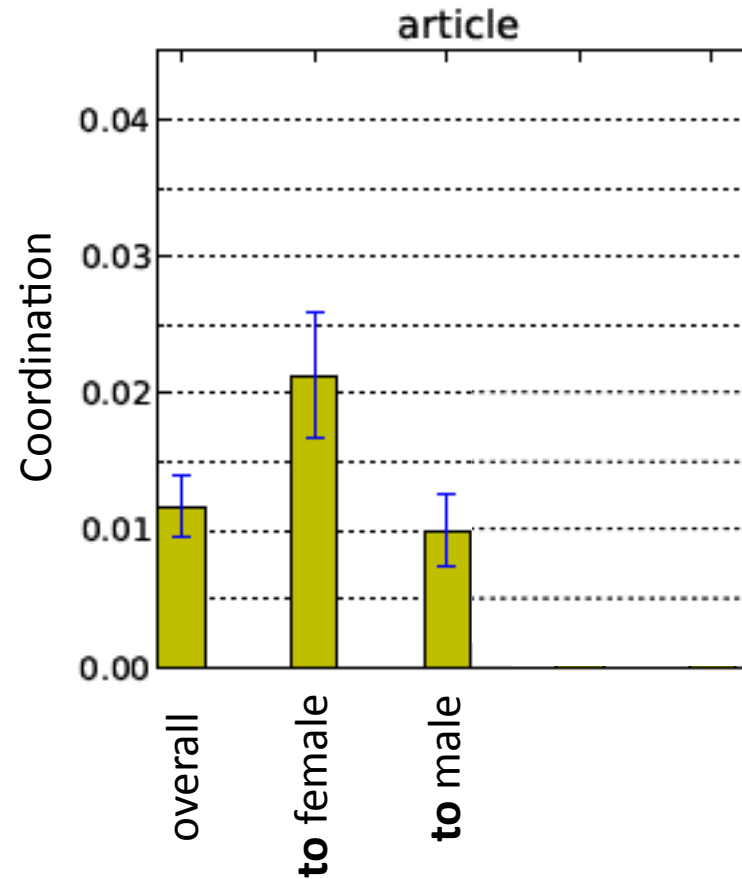# Movie characters coordinate!

[with Lillian Lee, forthcoming]

Movie characters coordinate!

> Coordination is so embedded in our language generation process, that it is exhibited **even in our imagined conversations.**
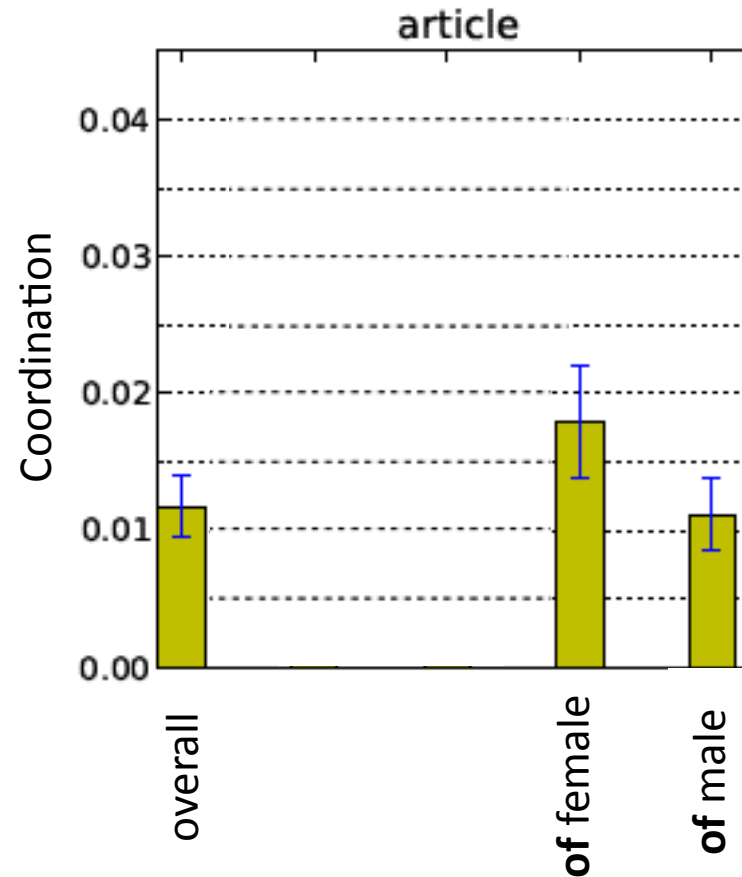
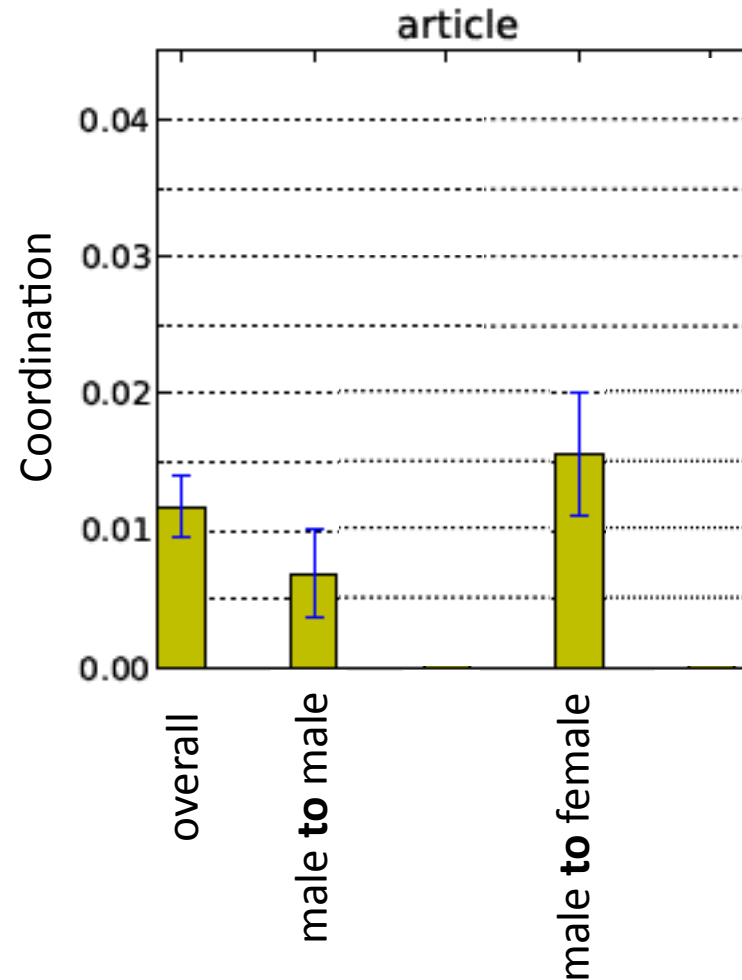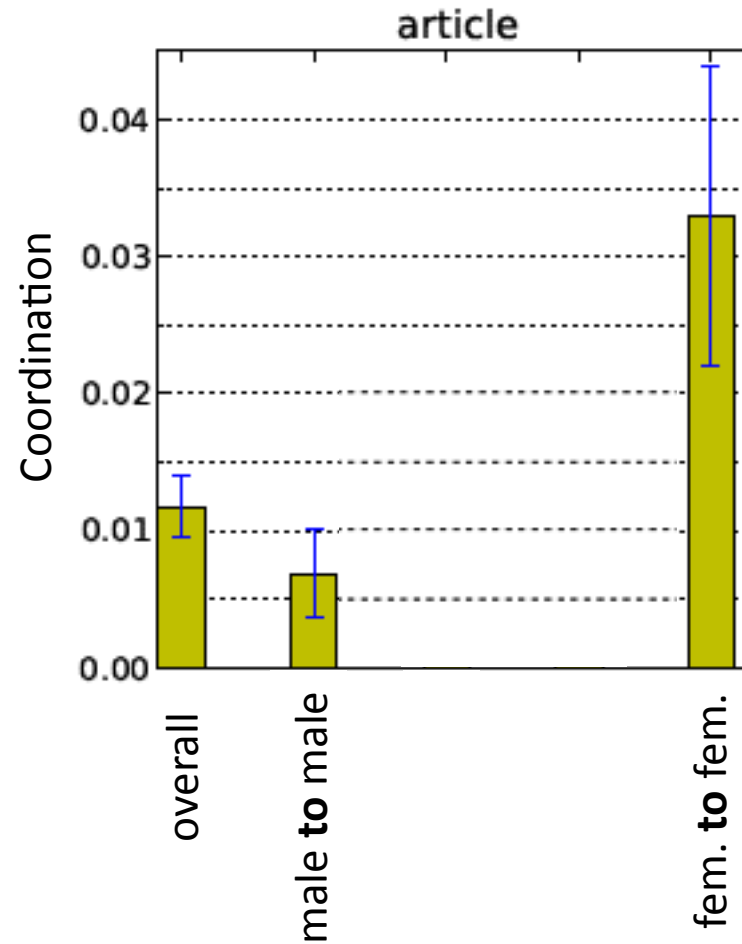[with Lillian Lee, forthcoming]

Stylistic influence and gender

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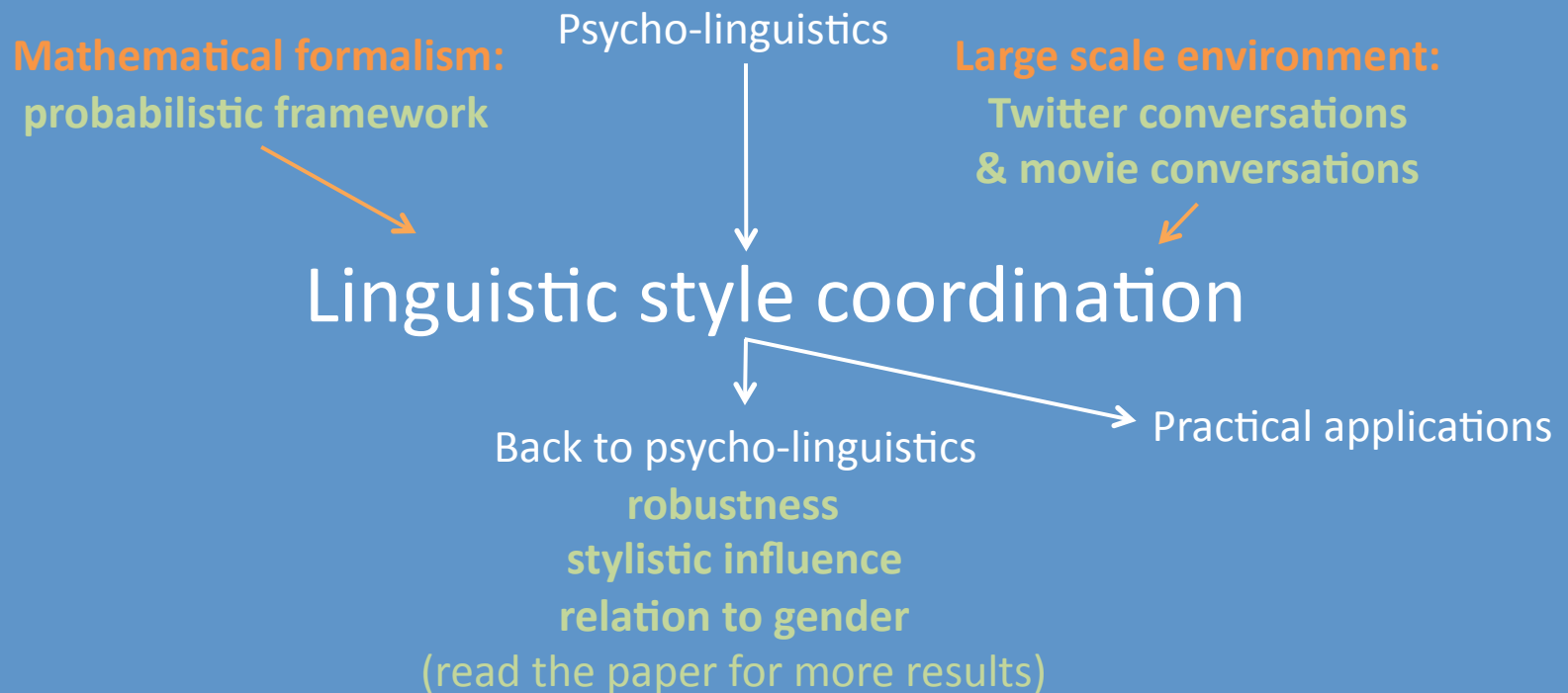[with Lillian Lee, forthcoming]

Stylistic influence and gender

[with Lillian Lee, forthcoming]

Stylistic influence and gender

[with Lillian Lee, forthcoming]

Contributions

Mathematical formalism: probabilistic framework

Psycho-linguistics

Large scale environment: Twitter conversations & movie conversations

Linguistic style coordination

Back to psycho-linguistics
robustness
stylistic influence
relation to gender
(read the paper for more results)

Practical applications

Thank you!

Thank you!

Good karma!