Chameleons in imagined conversations: A new approach to understanding coordination of linguistic style in dialogs

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Linguistic style: How things are said as opposed to what is said
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How things are said as opposed to what is said

Example:

Client: “At what time does your shop close?”

Shopkeeper: “At five o’clock.”
Shopkeeper: “Five o’clock”
Linguistic style:

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

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Client: “What time does your shop close?”

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Shopkeeper: “Five o’clock”

[Levelt & Kelter, 1982]
Linguistic style coordination occurs:
- instantaneously
- non-consciously
Linguistic style:
for us: function word class usage

Coordination is not just exact matching:
Client: “At what time does your shop close?”

Shopkeeper: “In two hours.”
Linguistic style coordination

When does it happen?
Linguistic style coordination

When does it happen?

face-to-face settings [Niederhoffer & Pennebaker, 2002]
- Watergate transcripts
Linguistic style coordination

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**non-real-time settings** [Danescu-Niculescu-Mizil et al. 2011]
- Twitter conversations (involves a wide spectrum of relationship stages)
Linguistic style coordination

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Across a wide range of conversational settings.
Linguistic style coordination

Why does it happen?
Linguistic style coordination

Why does it happen?

Actively debated for the last 40 years.
[Ireland et al. 2011, Branigan et al., 2010]

disclaimer: we are not solving this debate today
Linguistic style coordination

Why does it happen?

Hypotheses:

Social motivation

- to gain the other’s social approval [Giles 2008; Street & Giles, 1982]
- audience design [Clark, 1996; Bortfeld & Brennan, 1997]
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Unmediated reflex [Pickering and Garrod, 2004; Chartand and Bargh, 1999]
- deeply embedded in the language-generation process
Linguistic style coordination

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Does coordination occur when the interlocutors have no social motivations?

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Chameleons in imagined conversations
Linguistic style coordination

Why does it happen?

Does coordination occur when the interlocutors have no social motivations?

Proxy question:
Does coordination occur when the dialog is not generated by the interlocutors (i.e., by the ones gathering social benefits)?
Linguistic style coordination

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Proxy question:
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Case study: scripted movie dialogs
220,000 imagined conversations between 9000 characters from 617 movie scripts
Measuring coordination
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VINCENT: Antwan probably didn't expect Marsellus to react like he did, but he had to expect a reaction.
Measuring coordination

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JULES: He just massaged her feet, massaging someone's feet is nothing, I massage my mother's feet.
Measuring coordination

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Matching on article presence.
Measuring coordination

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JULES: It was a foot massage, a foot massage is nothing, I give my mother a foot massage.

Matching on article presence.
But matching ≠ coordination!
(e.g., chance, Tarantino likes articles, bad guys like articles)
Measuring coordination

What we want: how much *Jules’* inclusion of an article (say) immediately triggers the usage of articles in *Vincent’s* reply?

What we don’t want: how similar *Jules’* style is to *Vincent’s* style in general or how consistent Tarantino’s style is.
Measuring coordination

What we want: how much Jules’ inclusion of an article (say) immediately triggers the usage of articles in Vincent’s reply?

Coordination_{(V \ to \ J)}(art.) =
Measuring coordination

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\[ Coordination_{(V \text{ to } J)}(\text{art.}) = P(V^{\text{art.}} | V \text{ replied to } J, J^{\text{art}}) \]
Measuring coordination

**What we want:** how much *Jules’* inclusion of an article (say) immediately triggers the usage of articles in *Vincent’s* reply?

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- P(V^{\text{art.}} | V \text{ replied to } J)
\]

- **Trigger**
- **Control (for inherent similarity)**
Measuring coordination

**Overall coordination:** average over all pairs of characters \((B,A)\)

- **“Triggered” probability**
  \[ P(B^{art.} \mid B \text{ replied to } A, A^{art}) \]

- **Control probability**
  \[ P(B^{art.} \mid B \text{ replied to } A) \]
**Measuring coordination**

**Overall coordination:** average over all pairs of characters \((B,A)\)

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Chameleons in imagined conversations
Movie characters coordinate!
Movie characters coordinate!

“Triggered” probability

Control probability

Statistically significant (p<0.001) effect of coordination on all 9 function word categories considered
Movie characters coordinate!

Does coordination occur when the interlocutors have no social motivations?

Proxy question:
Does coordination occur when the dialog is not generated by the interlocutors (i.e., by the ones gathering social benefits)?

Yes!
Scriptwriters produce coordination despite not being the beneficiaries of the presumed social benefits
But what if ...

... we are only observing the effect of scriptwriters self-coordinating?
But what if ...

... we are only observing the effect of scriptwriters self-coordinating?

(we know people self-coordinate [Reitter et al. 2006])
Author self-coordination hypothesis

Coordination of Vincent to Jules:
Author self-coordination hypothesis

Coordination of Vincent to Jules:

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Self-coordination of the scriptwriter:

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Coordination of Vincent to Jules:


Self-coordination of the scriptwriter:

| Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino |

... would be the same or more than:

| Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino | Tarantino |
**Author self-coordination hypothesis**

**Coordination of Vincent to Jules:**

Jules  |  Vincent  |  Jules  |  Vincent  |  Jules  |  Vincent

... would be the same or more than the **character self-coordination** of J to J:

Jules  |  Vincent  |  Jules  |  Vincent  |  Jules  |  Vincent

**Self-coordination of the scriptwriter:**

Tarantino  |  Tarantino  |  Tarantino  |  Tarantino  |  Tarantino  |  Tarantino

... would be the same or more than:

Tarantino  |  Tarantino  |  Tarantino  |  Tarantino  |  Tarantino  |  Tarantino
It is not author self-coordination!

Coordination

Jules
Vincent
Jules
Vincent
Jules
Vincent

...it's actually less than the character self-coordination
Movie characters vs. real people
Movie characters vs. real people

Compare amount of coordination for each dimension:

![Chart comparing coordination between movie characters and real people](chart.png)
Movie characters vs. real people

Compare amount of coordination for each dimension:

- Negation
- Indef. pron.
- Quantifier
- Conjunction
- Article
- Aux. verb
- Adverb
- Pers. pron.
- Preposition

Graph showing comparison between Twitter and Movies for different dimensions of coordination.
Movie characters vs. real people

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Chameleons in imagined conversations
Movie characters vs. real people

Potential application in detecting faked conversations.

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Chameleons in imagined conversations
Effects of social features

In real life, some people coordinate more than others:

e.g.,

- effects of social status [Thakerar et al., 1982; Gregory and Webster, 1996]
Effects of imagined social features?

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Do such effects carry on when the social features are imagined?
Effects of *imagined* social features?

In real life, some people coordinate more than others:

e.g.,

- effects of social status [Thakerar et al., 1982; Gregory and Webster, 1996]

Do such effects carry on when the social features are *imagined*?

Have preconceptions about how certain people coordinate become embedded in this reflex?
Effects of *imagined* gender

Proxy for the gender of movie characters:

gender of the respective actors
Effects of **imagined** gender

![Graph showing coordination across articles]

- Coordinate from female to male overall.
Effects of *imagined* gender

![Graph showing coordination with imagined gender]

- Overall
- To female
- To male

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Chameleons in imagined conversations
Effects of **imagined** gender

![Chart showing coordination by gender](image-url)
Effects of **imagined** gender

![Bar graph showing coordination effects of imagined gender]

- Overall coordination
- Male to male coordination
- Female to female coordination
Effects of **imagined** gender

![Graph showing coordination effects of imagined gender transitions]

- Overall
- Male to male
- Male to female
Contributions

Discovered coordination effects in imagined conversations

Insight into the mechanism behind coordination

Preliminary evidence regarding preconceptions relating coordination to various social features

Large-scale, metadata rich corpus of imagined conversations publicly available!
Thank you!

VINCENT: I think we oughta leave.

JULES: That’s probably a good idea.