

Lecture 6: Non-verbal Communication

Cognition and Communication, Monday, Oct. 11th 2021

Kristian Tylén

Agenda

- Definitions
- Why worry about gesture?
- Co-speech gesture
 - The communicative role of gesture
 - What does gesture contribute?
- Gesture and thought
 - Gesture and memory
 - Gesture-speech mismatch
- Are gestures always beneficial?
- Discussion:
 - Differences and similarities between speech and gesture

Gesture...

- Definition:
 - A movement of the hands, arms, or head ...
 - ... that express an idea, opinion, or feeling
- Different from sign languages (which are conventional languages in their own right)



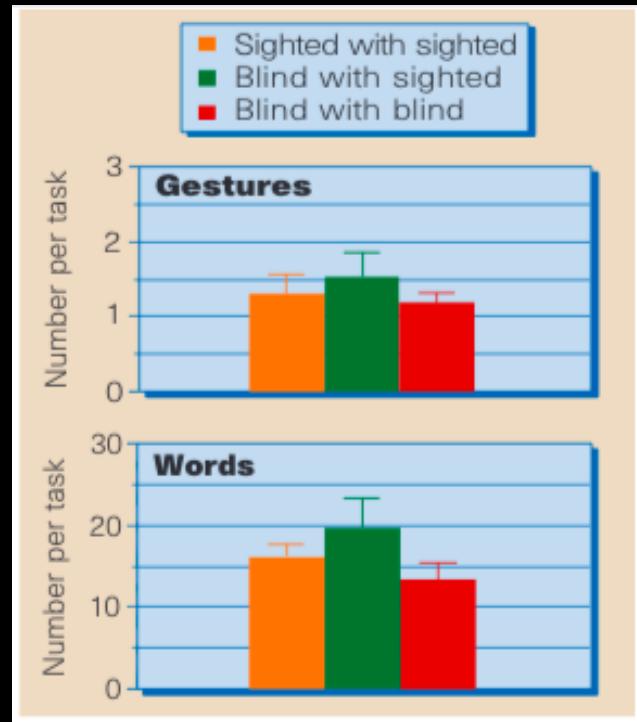
A typology of hand gestures

- Emblems
 - Conventional hand signs with rather fixed meanings
 - Examples: hand shapes like thumbs-up, fuck you, etc.
 - Consciously communicative (Goldin-Meadow, 1999:420)
 - Don't have to be accompanied by speech
- Spontaneous co-speech gesture
 - Accompany speech often in a timed and synchronized way
 - Not conventional (do not belong to a finite set with fixed meanings)
 - Probably not consciously produced
- Types of hand gestures
 - Deictic: pointing out references in space
 - Iconic: point to meaning by resemblance
 - Metaphoric: e.g. weighting arguments in the hands
 - Beat gestures: often rhetorical function, emphasis



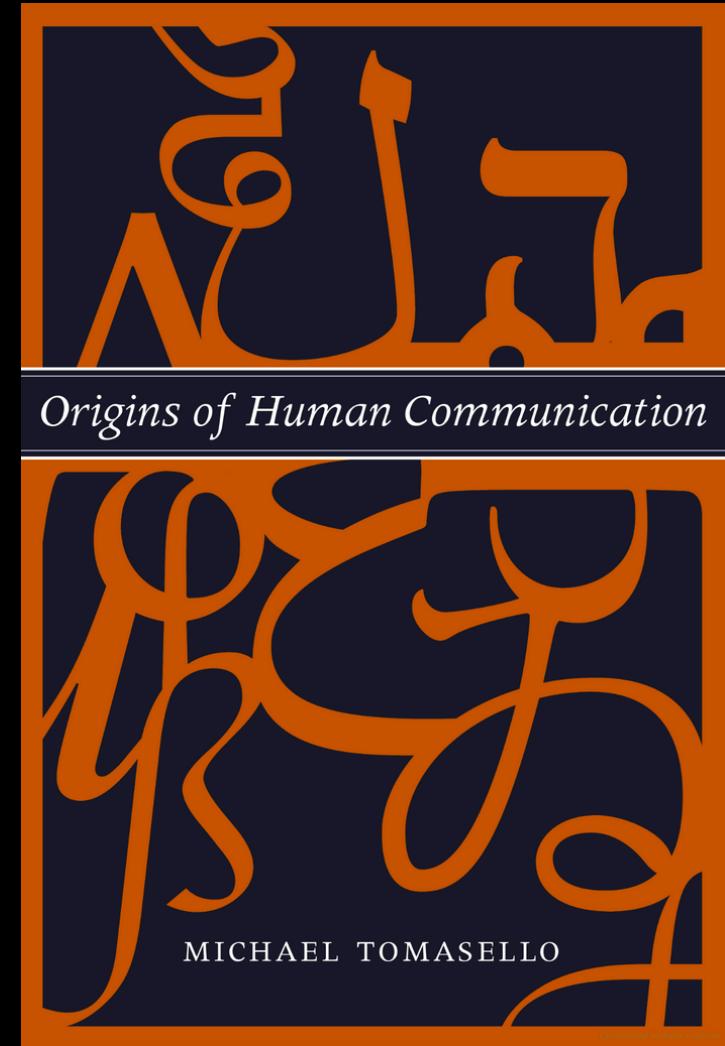
Why worry about gesture?

- A natural, spontaneous behavior:
 - congenitally blind speakers spontaneously gesture, even when they speak to a blind listener (Iverson & Goldin-Meadow, *Nature*, 1998)
- Central role in ontogenetic development and language acquisition (scaffold children's early communication and word learning)



Why worry about gesture?

- A gestural stage in the evolution of language?
 - Great apes do not have a vocal tract capable of making fine articulatory distinctions (cf. e.g. Koko and Kanzi)
 - But they use simple gestures and bodily displays, also in the wild
- Tomasello (2008:2):
“Indeed, my evolutionary hypothesis will be that the first uniquely human forms of communication were pointing and pantomiming (...) Pointing and pantomiming were thus the critical transition points in the evolution of human communication, already embodying most of the uniquely human forms of social cognition and motivation required for the later creation of conventional languages.”





How to Bootstrap a Human Communication System

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Concepts from three categories are communicated between pair of participants using either vocal gesture (no words), manual gesture or both

| Emotion | Action | Object |
|---------|----------|----------|
| Tired | Fleeing | Rock |
| Pain | Sleeping | Fruit |
| Angry | Fighting | Predator |
| Hungry | Throwing | Water |
| Disgust | Chasing | Tree |
| Danger | Washing | Hole |
| Happy | Eating | Mud |
| Ill | Hitting | Rain |

Fruit



Correct

Eating



Wrong

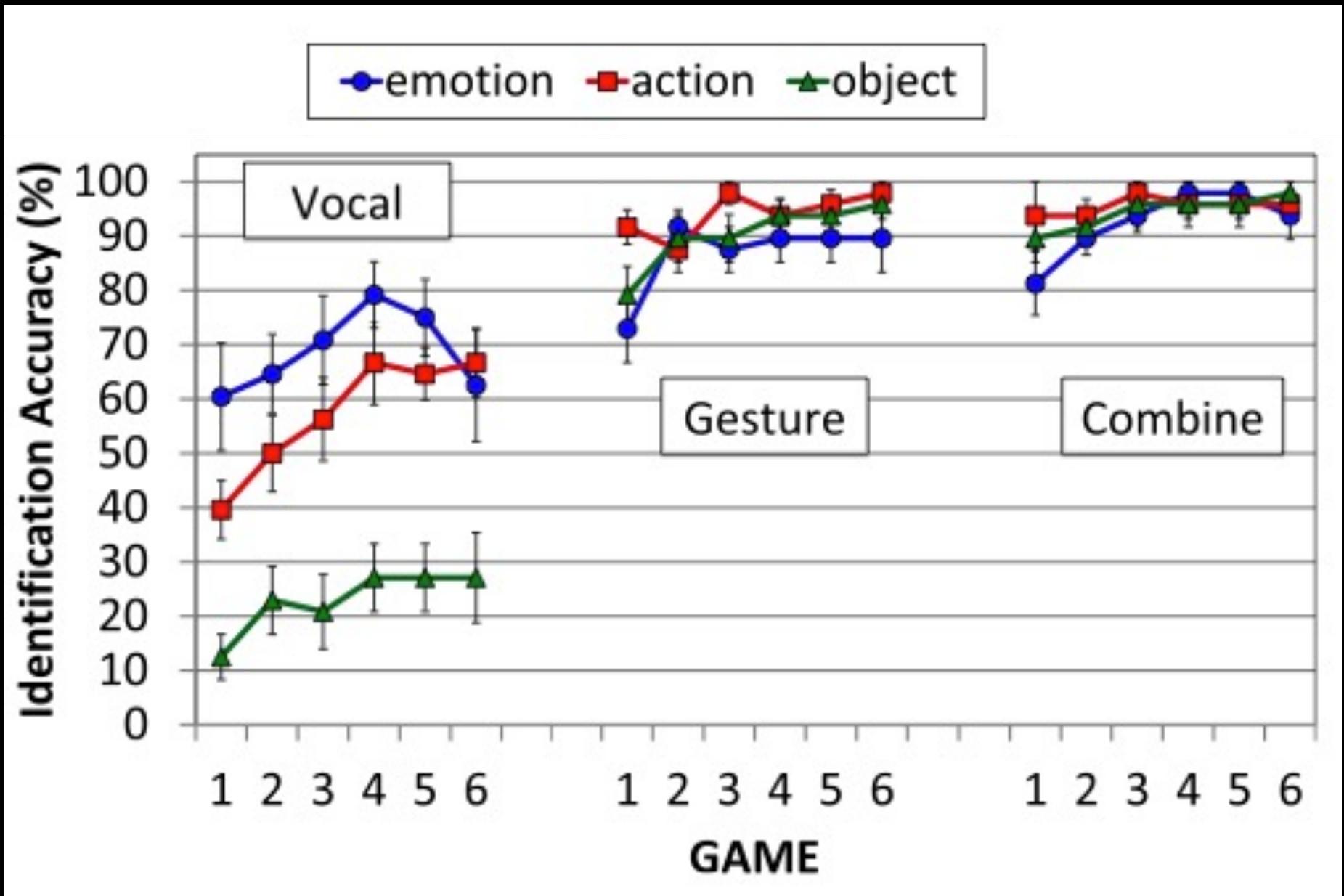
Fleeing



Correct



Wrong

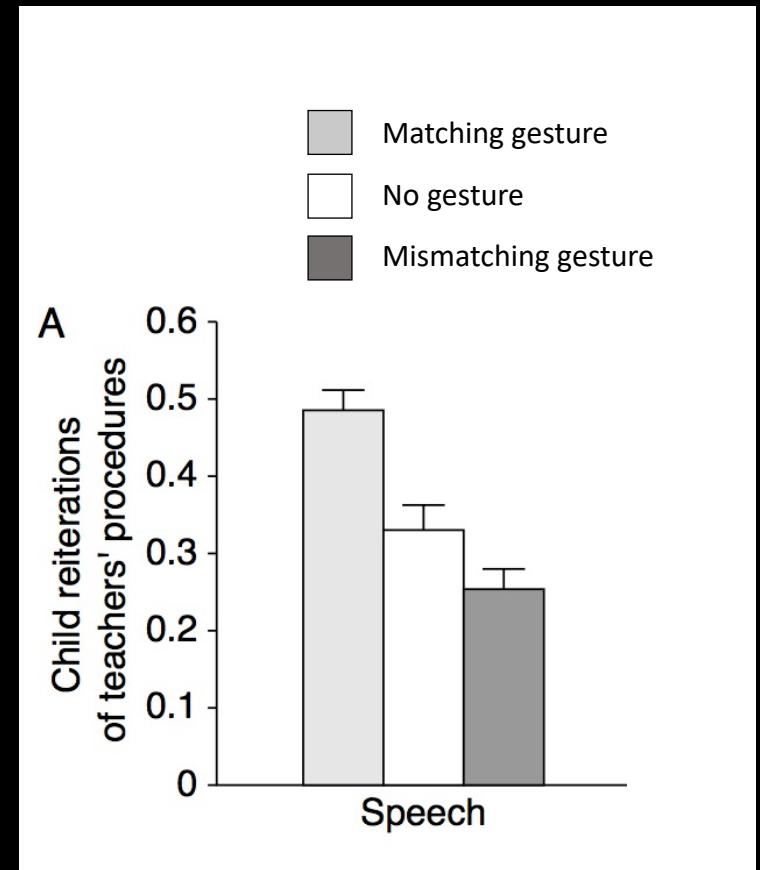


Co-speech gesture and communication



Gestures for communication

- Gestures can support information given in speech (Goldin-Meadow et al 1999)
 - By parallel expression in hand gesture (visual modality) the speaker can enhance the listener's understanding of a message
- Gesture can have a rhetorical role marking certain information as important (e.g. beats)
- Gestures can complement speech by fulfilling a discursive role
 - “would you hand me that? [+ pointing to object]”,
“and then he did like this [enacting behavior with hands]”
- Gestures can also be recruited when particular meanings are difficult to express in words





Available online at www.sciencedirect.com



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Speaking while monitoring addressees for understanding[☆]

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Received 7 October 2001; revision received 11 August 2003

- Pairs of participants were videotaped as a director instructed a builder in assembling 10 Lego models.
- Condition 1: directors and builders could see each other
- Condition 2: directors and builders could *not* see each other
- Condition 3: directors gave instructions by audiotape

Results

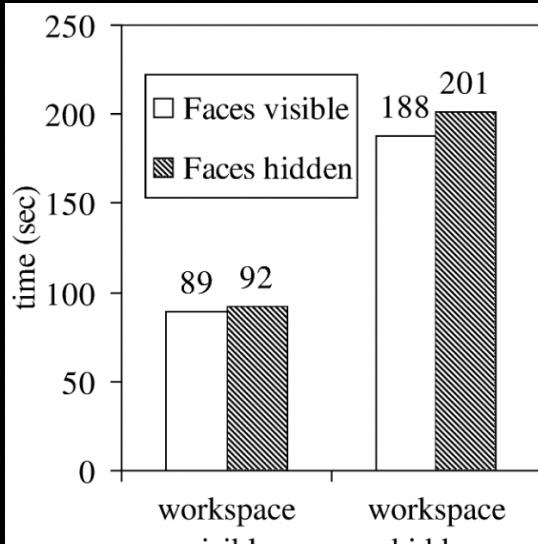


Fig. 1. Mean building times per model.

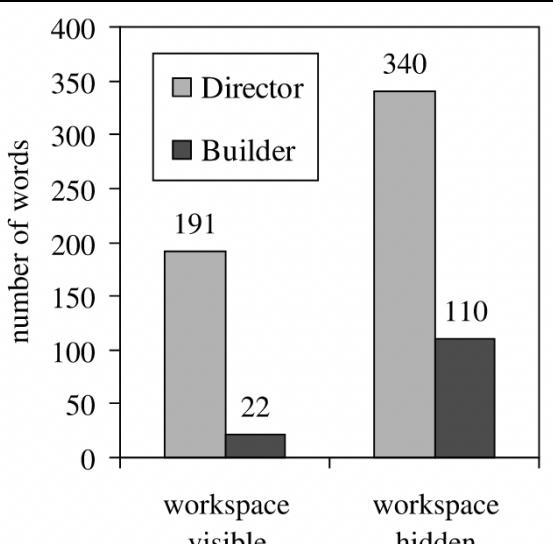


Fig. 2. Mean number of words per model.

Table 1

Percentage of errors in interactive instructions (workspace hidden condition) and in non-interactive instructions

| Condition | Model errors | Block errors |
|-----------------|--------------|--------------|
| Interactive | 5 | 0.8 |
| Non-interactive | 39 | 12.5 |

- “(...) partners were much slower when directors could not see the builders’ workspace, and they made many more errors when the instructions were audiotaped.”
- “When their workspace was visible, builders communicated with directors by exhibiting, poising, pointing at, placing, and orienting blocks, and by eye gaze, head nods, and head shakes, all timed with precision.” (2004:62)

Iconic Gestures Facilitate Discourse Comprehension in Individuals With Superior Immediate Memory for Body Configurations

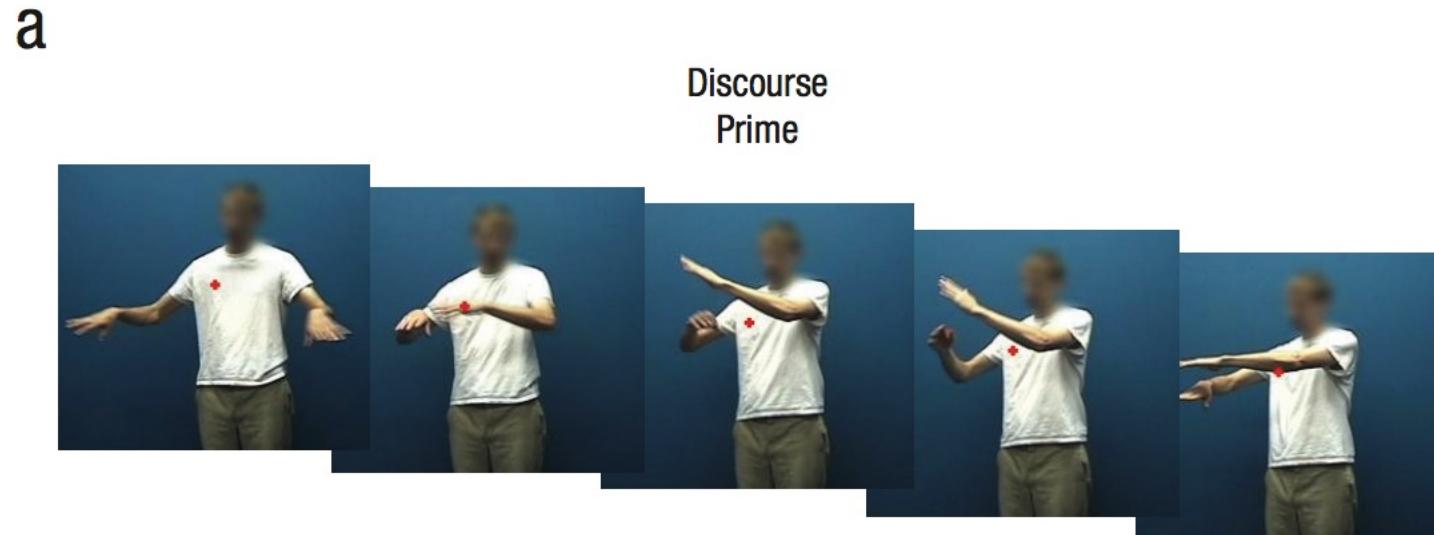
Ying Choon Wu¹ and Seana Coulson²

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- Task:

Multimodal prime (speech and gesture): description of an object or activity

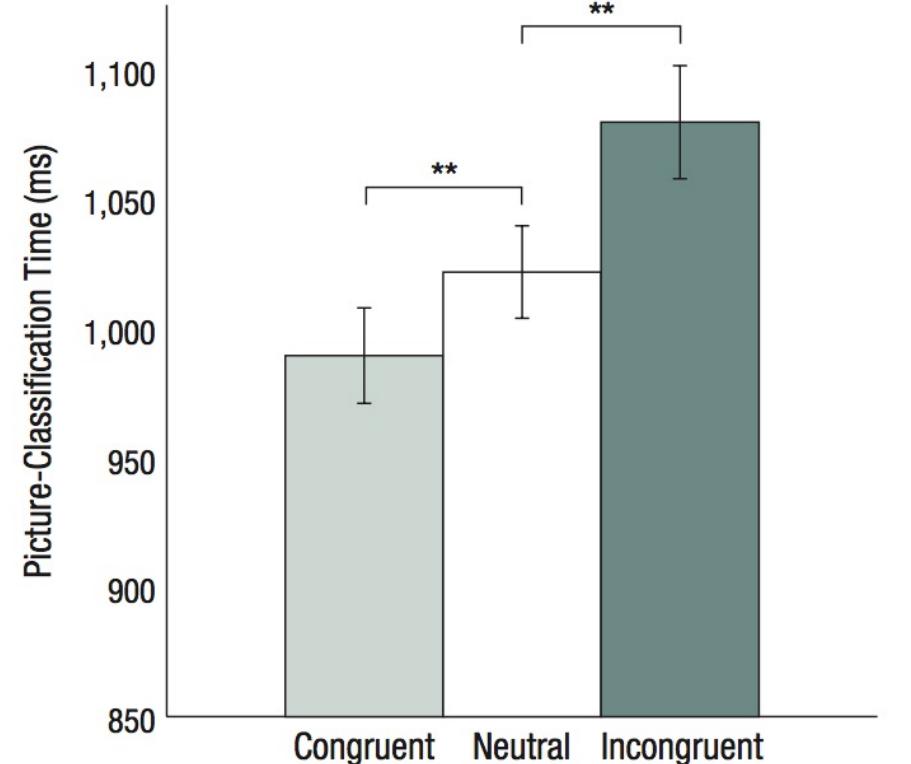
Picture probe: is this picture related or not to the preceding description?



“the top of the grand piano is also open”

- Conditions:

- Congruent gesture



- Incongruent gesture



- Neutral (no gesture)



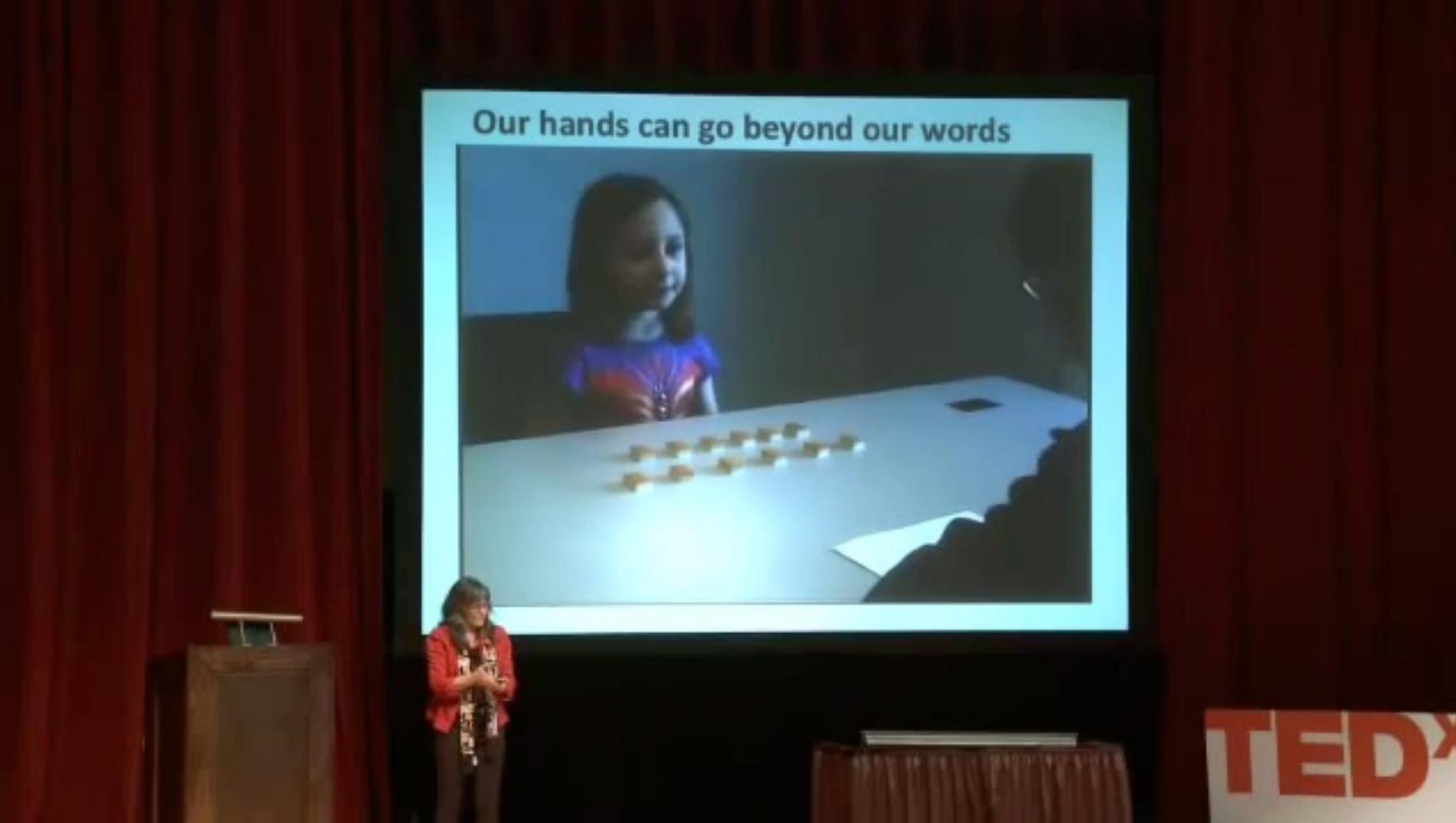
Fig. 4. Mean picture-classification time when the preceding discourse contained speech paired with congruent, incongruent, and no gestures (neutral condition). Error bars reflect 95% confidence intervals. Asterisks indicate significant differences between conditions (** $p < .01$).

Gestures for thinking

- We also spontaneously gesture when our communicative partner can't see us (i.e. our gestures do not serve a communicative function)
- Gesture helps speakers retrieve words from memory (Rauscher, et al. 1996, but see also Kisa et al 2021)
- Gesture reduces cognitive burden, e.g. pointing when counting (Alibali & DiRusso 1999)



Gestures reveal our thoughts (sometimes unknown to ourselves!)



- Speech-gesture mismatch

Gestures for Thinking

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Example 1: 4S outdoor environment

Etna is a charming town nestled in an attractive valley, entered on River Highway. River Highway runs east-west at the southern edge of the town of Etna. Toward the eastern border, River Highway intersects with Mountain Rd, which runs north of it. At the northwest corner of the intersection is a gas station. North of the gas station, Mountain Road will intersect with Maple Ave, which runs west.

| | Verbatim | Inference |
|---------------|--|--|
| Route | Going east on River Highway, at the intersection with Mountain Rd, you will find a gas station on your left. | From Mountain Rd, turn right on River Highway and you will have the Gas Station on your right. |
| Survey | North of the gas station, Mountain Road will intersect with Maple Ave, which runs east. | South of Maple Ave to the west of Mountain Rd is the Gas Station. |

Results

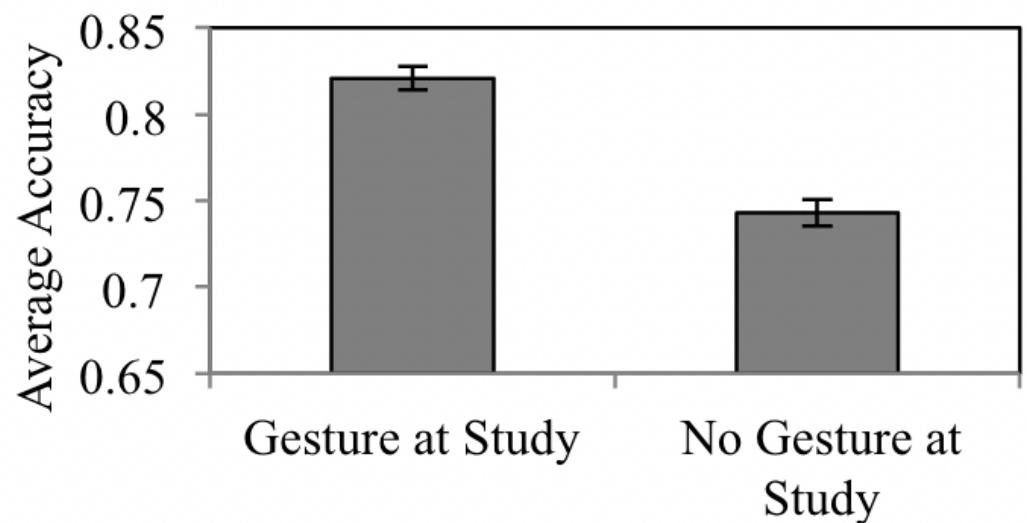


Figure 3. Accuracy by gesturing at study. Error bars represent standard error

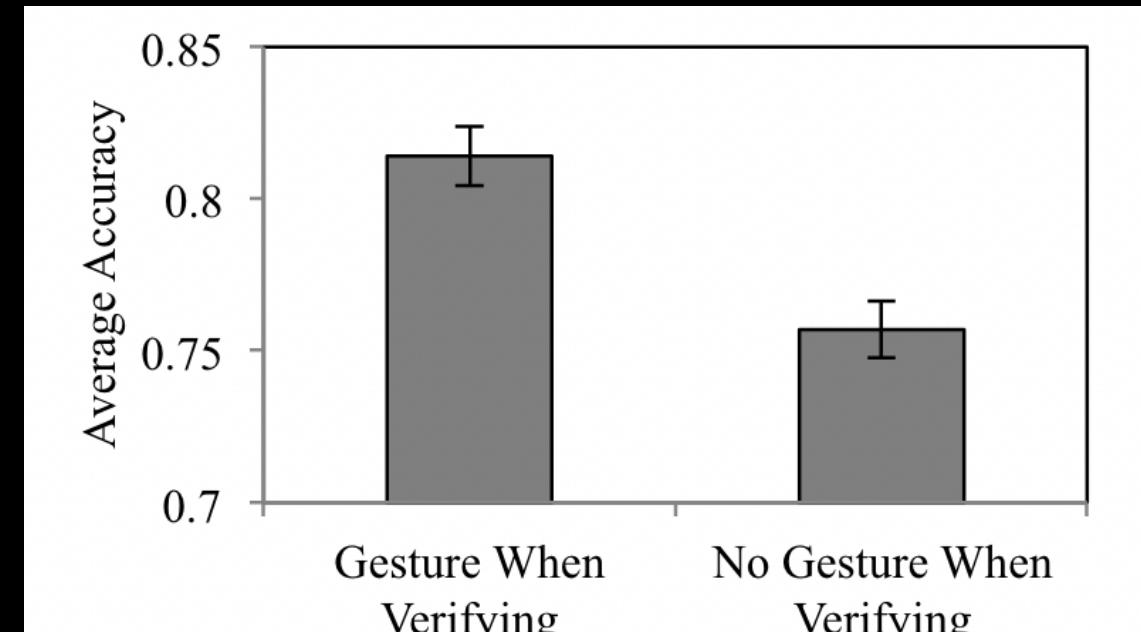
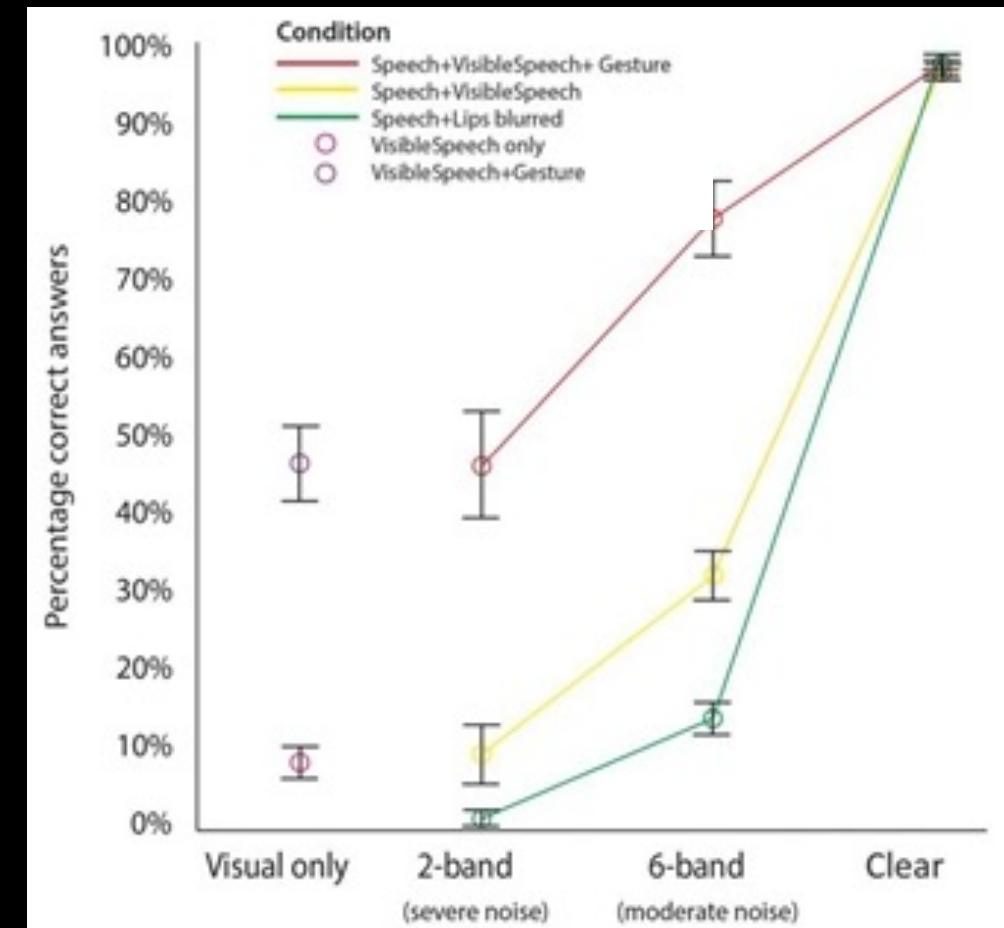
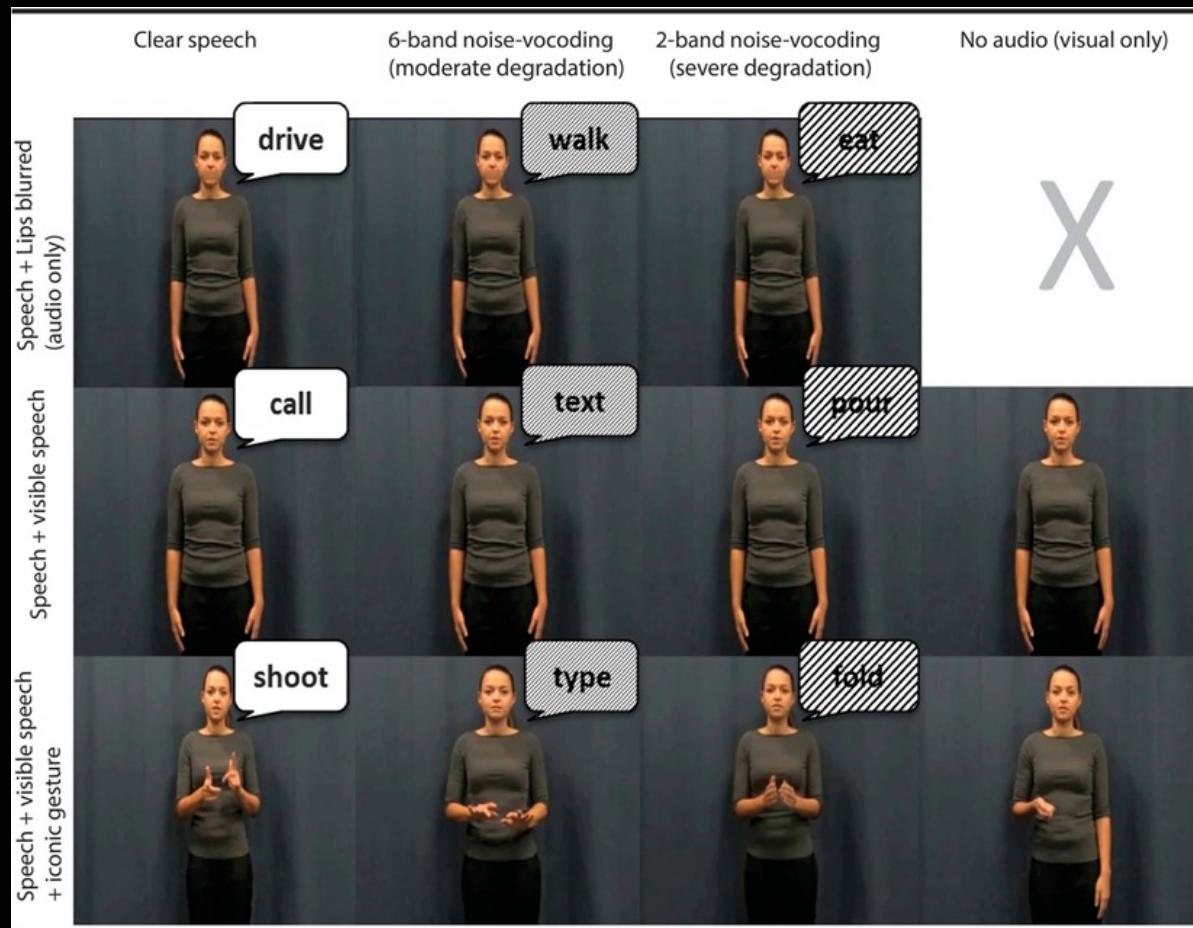


Figure 4: Accuracy by gesturing at verification.

- “the descriptions accompanied by gestures were remembered better than those that were not, and the questions that were accompanied by gestures were answered more accurately than those that were not.(...)
- Gestures appeared to improve learning by establishing embodied representations of the structures of the environments and appear to improve memory by reintegrating the queried parts of the environments. “ (Jamalian et al, 2013:649)
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The role of gestures in communication

Drijvers, L., & Özyürek, A. (2017). *Journal of Speech, Language, and Hearing Research*



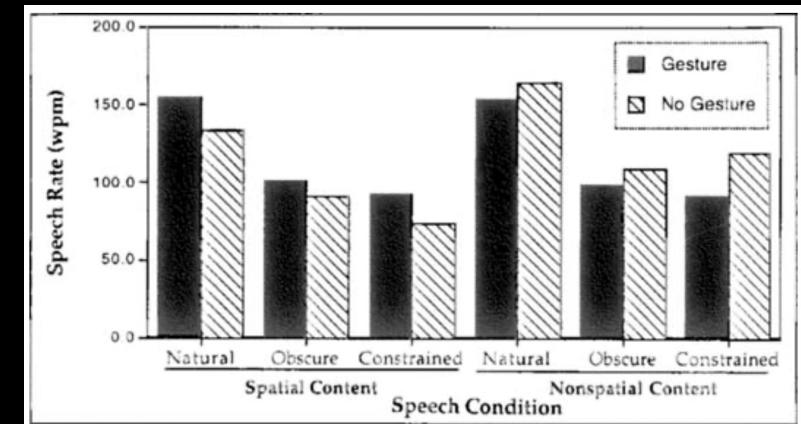
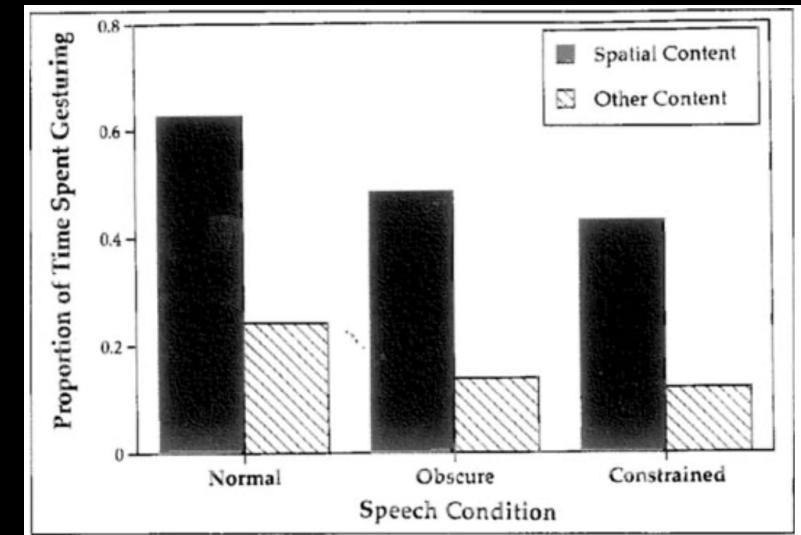
Discussion

- What are the differences in the way that speech and gesture convey information?
- Which kinds of meaning may afford gesture and which speech (what are gestures especially good/bad for)?
- Why?

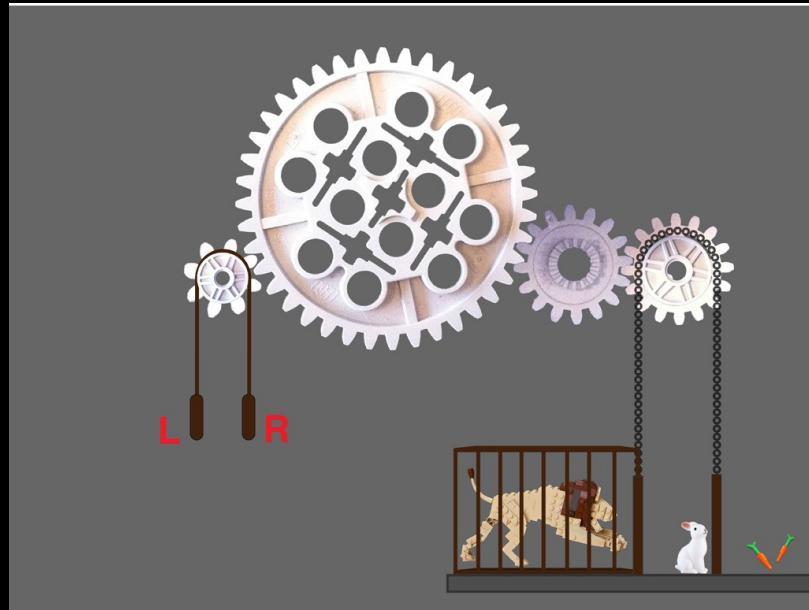
The role of gestures in facilitating the speaker

Rauscher, F. H., Krauss, R. M., & Chen, Y. (1996). *Psychological science*

- Gesture and lexical access:
 - Does it affect speech fluency (retrieval of words), if speakers can gesture or not?
- Participants were shown cartoons and told to retell them under different conditions:
 - either allowed to gesture or not
- Findings:
 - Participants gestured more when talking about spatial content
 - Speech was more fluent when participants were allowed to gesture ...
 - ... but only for the spatial content



The role of gesture in thinking/cognition



MIXED CAUSAL STRATEGY

Do gestures always do good?

Research Report



Spontaneous Gestures Influence Strategy Choices in Problem Solving

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<http://pss.sagepub.com>



- Participants solved a version of the cogwheel task either with their hands or feet fixated
- Task: “Imagine four gears are arranged in a horizontal line. If you turn the gear on the left clockwise, what would the gear on the right do?” (4, 7, 9, 5, 8, 6 gears)
- Question: who reach the more efficient counting strategy (the parity principle: odd or even number of gears)?

Results

Experiment 1: with think-aloud protocol

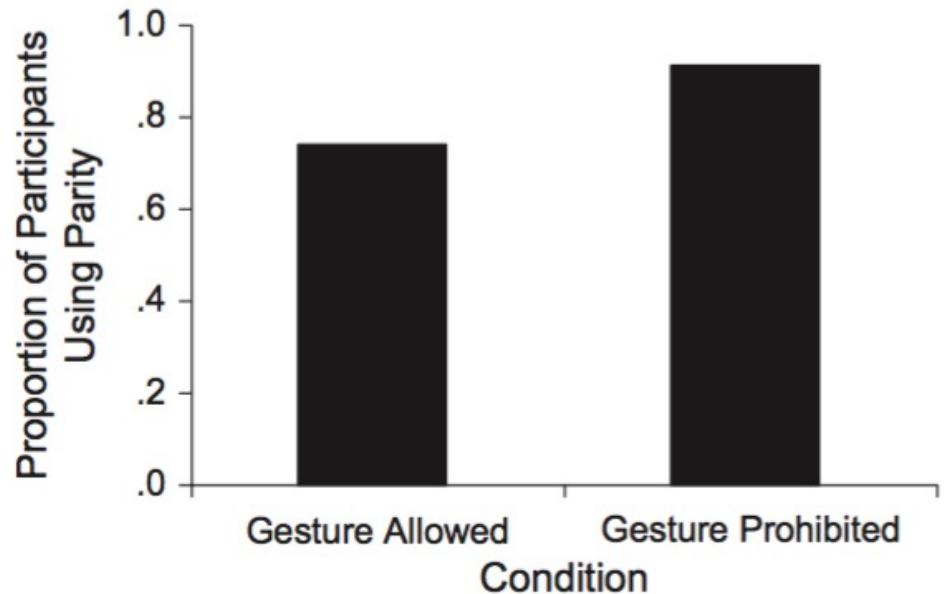


Fig. 1. Proportion of participants in the gesture-prohibited and gesture-allowed conditions of Experiment 1 who used the parity strategy on at least one trial.

Experiment 2: without think-aloud protocol

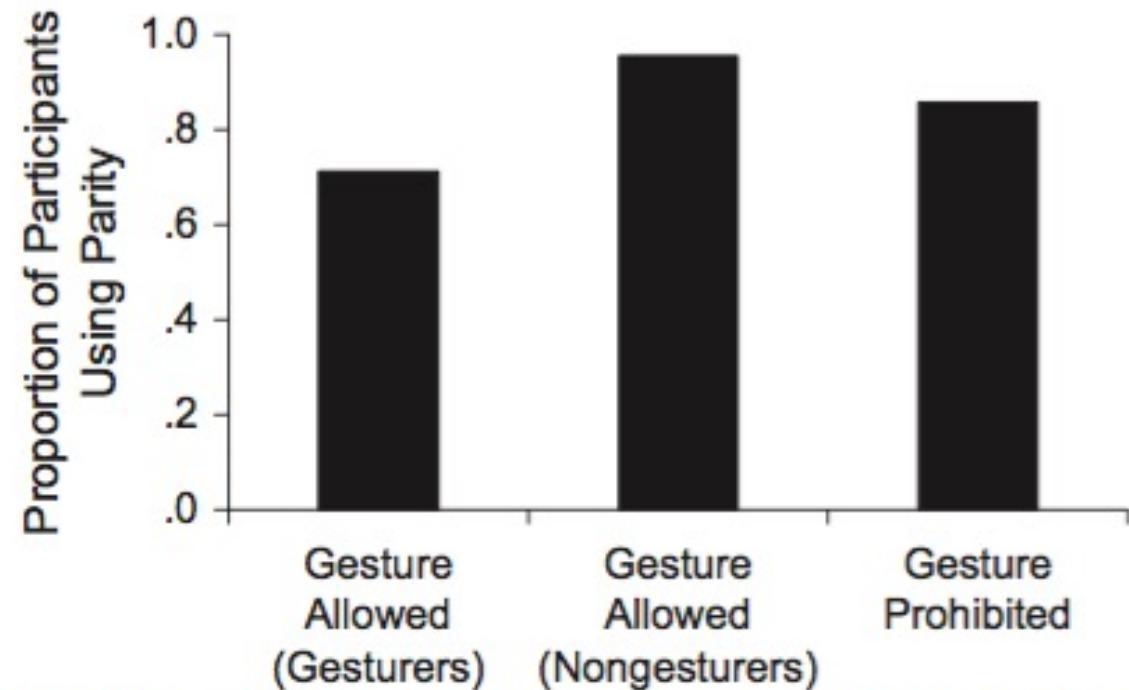


Fig. 2. Proportion of participants in the gesture-prohibited and gesture-allowed conditions of Experiment 2 who used the parity strategy on at least one trial. Participants in the gesture-allowed condition were divided into two groups: gesturers and spontaneous nongesturers.

Take Home

- Gestures occupy an important role in relation to language both on ontogenetic and phylogenetic perspectives
- Co-speech gestures seem to facilitate communication in many contexts
 - enhance accuracy and reaction times in comprehension tasks
 - or change the the understanding of a message
 - facilitate the speakers word retrieval (?)
- Gesture also facilitate many forms of reasoning (we gesture for our selves)
 - Memory, math, problem solving
 - ... but only in some domains of meaning?
- There are important ways in which verbal and non-verbal language complement each other possibly because they rely on different means of reference