Temporal sequence and the alignment of gesture and speech

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goals of this talk

- a closer look at post-speech gestures
  (compared to co-speech gestures)
- a comparison of certain kinds of appositives with certain kinds of gestures
- a new suggestion:
  'gradual at-issueness'
corpus example: co-speech

It is on a [grey base made of concrete] \textit{+ic-g}. Three meters high. And on it, there are [red tubes] \textit{+ic-g}.
results of gesture research


  Here: about the form of the base and the shape of the tubes

- gesture and speech are temporally aligned (Pittenger, Hockett, & Danehey 1960; Loehr 2004; Ebert, Evert & Wilmes 2011 and many more)

  Here: 'round' gesture with base and 'tube-shape' gesture with tubes
temporal alignment

gesture types according to temporal alignment with speech (terminology along the lines of Schlenker 2017)

pre-speech

no research in formal semantics yet

pro-speech

Ebert 2014, Schlenker & Chemla to appear, Schlenker 2017

co-speech

Ebert & Ebert 2014, Schlenker to appear

post-speech

Schlenker to appear, Esipova 2017 Ebert in progress
co-speech gestures

semantic interpretation
(1) *I brought [a bottle of water] to the talk.*

**at-issue:** semantic content of the speech signal:
speaker brought a bottle of water to the talk

**nicht at-issue:** semantic content of the gesture (roughly):
The bottle is big
gesture meaning is not at-issue

- ‘multidimensional meaning’ (z.B. Potts 2005):
  - at-issue: information that is for disposition
  - not at-issue: further side information

- words, phrases, and sentences can contribute meanings on different dimensions (vgl. Grice 1975)

- formal approaches: Potts 2005; Gutzmann 2012; Koev 2013; AnderBois et al. 2015, ...
co-speech gestures behave like appositives

appositives contribute non-at-issue information

(2) Ludger Beerbaum, an outstanding show jumper, was accused of doping.

(NA)

(3) Ludger Beerbaum, who is an outstanding show jumper, was accused of doping.

(ARC)

- transmit information that is not the goal of the utterance
- this information is not for disposition
appositives are not at-issue (Potts 2005)

- direct denial
  appositives cannot be directly denied in discourse

- projection
  appositives project, i.e. they cannot be interpreted in the scope of a modal or a negation

- Non-at-issue material can be ignored in ellipsis
  (Potts et al. 2009)
Direct denial

to appositive

(4) Lance Armstrong, a world class cyclist, started his career at the age of 12.

Direct denial response:

(5) That's not true! He wasn't a world class cyclist, he was a world class trumpeter.

Discourse interrupting protest:

(6) Hey, wait a minute! He actually he was a world class trumpeter, not a cyclist.

to main clause VP

(7) Lance Armstrong, a world class cyclist, started his career at the age of 12.

Direct denial response:

(8) That's not true! He started his career at the age of 16.
projection

with appositive

(9) It is not true that Lance Armstrong, a world class cyclist, started his career at the age of 12.

Negation elaboration:

(10) #He was a world class trumpeter.

with main clause VP

(11) It is not true that Lance Armstrong, a world class cyclist, started his career at the age of 12.

Negation elaboration:

(12) He started with about 16.
ellipses

- Expressive content can be ignored under ellipsis
  (Potts et al. 2009)

  (13)
  A: *I saw your f***ing dog in the park.*
  B: *No, you didn’t — you couldn’t have. The poor thing passed away last week.*

- Holds also for appositive content:

  (14)
  A: *I met Peter, the best trumpeter in town, for lunch.*
  B: *Last week, I did, too. — But I don't think, he is such a great trumpeter.*
Ebert & Ebert

direct denial

speech and gesture

(15) I brought [a bottle of water] to the talk.

(16) #That's not true! You actually brought a small bottle.

discourse interrupting protest:

(17) Hey, wait a minute! Actually, the bottle is not as big.

only speech

(18) I brought a big bottle of water to the talk.

(19) That's not true! You actually brought a small bottle.
On train journeys, I never take
[a bottle of water] with me.

Elaboration:
(21) #There, I need a big one.

On train journeys, I never take
a small bottle of water with me.

Elaboration:
(23) There, I need a big one.

gesture content projects (like appositive content) and cannot be interpreted as restricting the NP.
Ebert & Ebert

ellipsis

co-speech gesture

(24) *This helicopter will soon [take off],*

*and this plain, too.*

pro-speech gesture

(25) #This helicopter will

*soon*

*and this plain, too.*

(from Schlenker & Chemla 2016)
Make use of ideas of Koev (2013) and AnderBois et. al. (2015) to account for at-issue/non-at-issue distinction

uni-dimensional and dynamic system
→ accounts for anaphora/binding between different levels

Keep track of at-issue/non-at-issue content via propositional variables $p, p^*$:

- At-issue proposal: $p$
- Non-at-issue imposition: $p^*$

rough approximation of pragmatic use (cf. Farkas & Bruce, 2010):
- is on the table for discussion
- is not for discussion and silently imposed
I brought [a bottle of water] to the talk.

\[ [x] \land \text{bottle}_p(x) \land \text{bring}_p(\text{speaker}, x) \]

'lexical' gesture semantics:

\[ [z] \land z = \text{\textlangle g}} \land \text{SIM}_p^*(x, z) \]

temporal alignment:

\[ [x] \land \text{bottle}_p(x) \land [z] \land z = \text{\textlangle g}} \land \text{SIM}_p^*(x, z) \land \text{bring}_p(\text{speaker}, x) \land \text{SIM}_p^*(x, z) \]
co- vs. post-speech gestures

2 views
temporal alignment

gesture types according to temporal alignment with speech (terminology along the lines of Schlenker 2017)
corpus example: post-speech

"With one round tower. [ ]+ic-g With one round..."
corpus example: post-speech

"Such a curve. [ ]+ic-g [I went along there] +ic-g."

Bielefelder Speech-and-Gesture-Alignment (SaGA) Korpus, Projekt B1 Speech-gesture-alignment, SFB 673 Alignment in Communication (Lücking et al. 2013)
co- & post-speech gestures

temporal alignment and interpretation of the gesture

Ebert & Ebert (2014),
Ebert (in progress)

Schlenker (to appear)
co-speech: Schlenker

- Co-speech gestures do not behave like supplements, but rather like a special kind of presupposition, i.e. like cosuppositions.
- An expression \( p \) with a co-occurring gesture with content \( g \) comes with the requirement that it holds that \( p \) entails \( g \).

a. *John [helped] his son.*
   
   **entails:**
   
   John helped his son by lifting him.

b. *John didn’t [help] his son.*
   
   **entail:**
   
   If John (had) helped his son, he would have done so by lifting him.

c. *Did John [help] his son?*
co vs. post: Schlenker

Interpretational difference between co- and post-speech gestures

- **co-speech gestures** are **co-suppositional**, they behave like presuppositions

co-speech:

(26) *One student brought a bottle of water to the meeting.*

→ **cosupposition**: *If a student brings a bottle of water to the meeting, it will be a big one*

➔ *One student brought a big bottle of water to the meeting*
co vs. post: Schlenker

- post-speech gestures behave like appositives

post-speech:

(27) One student brought a bottle of water to the meeting.

leftrightarrow appositive: One student brought a bottle of water to the meeting, which was big (by the way).
predictions

- presuppositions are unproblematic in downward entailing contexts, appositives are not licensed (cf. Potts 2005)

(28) #No student brought a bottle of water, which was big by the way.

(29) No student brought a bottle of water.

+ cosupposition:
  If a student brings a bottle of water, it will be a big one.
predictions

- Schlenker (2016): in negative environments, co-speech gestures also receive a presuppositional interpretation.

  *I did not bring* [a bottle of water].

  **Asserted:** the speaker did not bring a bottle of beer
  **Presupposed:** If the speaker had brought a bottle it would have been a big bottle

- Ebert & Ebert (2014): odd or interpreted as the gesture associating with the NP (concept-related reading): the speaker takes beer bottles to be that big by default.
predictions

temporal alignment and interpretation of the gesture

Ebert & Ebert (2014), Ebert (in progress)

Schlenker (to appear)
experimental study

- predictions can be experimentally tested (see also Tieu et al. 2016, 2017)

- Here: pilot study as part of
  
  PSIMS (Ebert, Fuchs, Krifka 08/2017-07/2020):
  
  The Pragmatic Status of Iconic Meaning in Spoken Communication: Gestures, Ideophones, Prosodic Modulations

Thanks to Helin Dag, Asha Elayaperumal, Fabienne Metzger, Vanessa Kühn, and Seda Sarizeybek for help with item and filler design and experiment execution.
context:
In kindergarten, the children had to cut out different forms.

a. One child managed to cut out a geometrical form.

b. No child managed to cut out a geometrical form.

c. One child managed to cut out a geometrical form.

d. No child managed to cut out a geometrical form.
Ein Kind hat es geschafft, 'ne geometrische Form auszuschneiden.  

'One child managed to cut out a geometrical form.'
context:
Im Kindergarten sollten die Kinder verschiedene Formen ausschneiden. 'In kindergarten, the children had to cut out different forms.'

\[\text{Aber kein Kind hat es geschafft, 'ne geometrische Form auszuschneiden.}\]

'But no child managed to cut out a geometrical form.'
experimental study

FILLER items:

- lexically ambiguous items with matching, non-matching co- and post-speech gestures
- example: non-matching co-speech gesture

context: Auf dem Bauernhof sind viele Tiere sehr früh munter.

item: Der Hahn zum Beispiel ist ein solcher Frühaufsteher.

context: On a farm, many animals wake up early in the morning.

item: The rooster is such an early riser.
experimental study

Context:

"Auf dem Bauernhof sind viele Tiere sehr früh munter."  
"On a farm, many animals wake up early in the morning."

non-matching co-speech

"Der Hahn zum Beispiel ist ein solcher Frühaufsteher."

'The rooster is such an early riser.'

(German Hahn also: tap)
experimental study

- materials
  16 experimental items (16 fillers)

- independent variables
  DETERMINER: *one* vs. *no*
  POSITION: co-speech vs. post-speech

- participants
  32 native speakers of German
task

On a scale from 1 to 10:

*How natural do you consider the utterance in the video in the given context?*

(instruction beforehand: pay good attention to picture and sound)
experimental study

predictions

a. One child managed to cut out a geometrical form.

b. *E&E No child managed to cut out a geometrical form.

c. One child managed to cut out a geometrical form.

d. *S/E&E No child managed to cut out a geometrical form.

- Ebert & Ebert: no interaction effect
- Schlenker: interaction of DETERMINER and POSITION
NO generally worse than ONE
post-speech tends to be worse than co-speech
no interaction $\Rightarrow$ evidence for Ebert & Ebert

We would like to thank Robin Hörnig for help with the experimental analysis.
post-speech gestures

a closer look
gesture types according to temporal alignment with speech (terminology along the lines of Schlenker 2017)
at-issue appositives

- Some appositives can apparently be at-issue
  (AnderBois et al. 2015; Koev 2013; Syrett & Koev 2014)

- Direct denial is possible with sentence-final ARCs

  (30) A: Peter bought a trumpet, which was extremely expensive by the way.
       B: No, it wasn't that expensive.

  (31) A: A trumpet, which was extremely expensive by the way, is one of the instruments that Peter bought the other day.
       B: ??No, it wasn't that expensive.
at-issue appositives

Question: why are appositives at-issue in these cases?

- AnderBois et al. 2015:
  appositives enjoy a “broader range of possible interpretations, behaving in many respects as though they were conjunctions rather than true appositives”

- Syrett & Koev 2014:
  "we propose to account for the shifting status of ARCs [...] by assuming that ARCs can compete with main clauses for at-issue status (that is, either is in principle a candidate for at-issue status), and by relating the ordering of the appositive assertion and the main clause assertion to the overall flow of discourse" (my emphasis)
at-issue appositives

- Syrett & Koev (2014):
  - all appositives (both NAs and ARCs) and main clauses introduce independent assertions
  - in principle, either can be at issue – they compete
  - the proposition that is processed last is at issue
  - ARCs can be attached to either the anchor or the root node
  - recency of assertion has an effect on its at-issue status

  *the symphony hired my friend [DP Sophie [CP who is a classical violinist]]
  [CP1 the symphony hired my friend Sophie] [CP2 who is a classical violinist]*
at-issue appositives

- Also: some appositives seem to be interpretable in the scope of modal operators, i.e. they do not seem to project (Wang et al. 2006; Nouwen 2014)

- Appositive one-modifiers (a subtype of NAs) often do not project:

  *If a professor, a famous one, publishes a book, he will make a lot of money.*

  *Mary wants to marry an Italian, a rich one.*
Koev (2013) hypothesizes that one-"appositives" are in fact not appositive constructions but a special kind of restricting modifier (cf. Nouwen 2014).
gradual at-issueness

- pieces of information compete for at-issue status
- slogan 'gradual at-issueness':
  
  "The more stand-alone a piece of information is, the more at-issue it is."

- stand-alone:
  - temporally independent or separated
  - other "stand alone" features like finiteness

- predicts inter- and intra-subjective variability
gradual at-issueness

Denial Examples (response: *No, THAT was LOUIS Armstrong!*)

- completely out:
  
  Lance Armstrong, the virtuosic trumpeter, survived a severe cancer disease.

- slightly better (?):
  
  Lance Armstrong, who was a virtuosic trumpeter, survived a severe cancer disease.

- better:
  
  Among the people who survived a severe cancer disease we also find Lance Armstrong, the virtuosic trumpeter.

- even better:
  
  Among the people who survived a severe cancer disease we also find Lance Armstrong, who was a virtuosic trumpeter.
gradual at-issueness

Showing the same with gestures instead of appositives
gradual at-issueness

Denial Examples (response: *No, THAT was LOUIS Armstrong!*)

- completely out: [Lance Armstrong] survived a severe cancer disease.

- slightly better (?):  
  Among the people who survived a severe cancer disease we also find [Lance Armstrong].

- better:  
  Among the people who survived a severe cancer disease we also find Lance Armstrong.

- even better:  
  Among the people who survived a severe cancer disease we also find Lance Armstrong.  
  [...pause...]
gradual at-issueness

- principle of 'gradual at-issueness' is supposed to also include information from different channels, i.e. speech, gesture, mimics, ...
- Emphasizes aspects of temporal occurrence
  - Temporal coincidence
    - → strong competition
    - → clear at-issue/non-at-issue distribution
  - Temporal proximity → facultative competition
- comma intonation of appositives ↔ temporal coincidence
gradual at-issueness

temporal alignment crucial for interpretation of the gesture

like appositives

at-issue

not at-issue
gradual at-issueness

in the spirit of gradual at-issueness, post-speech gestures can be

- **integrated**: behave like ordinary appositives, i.e. receive a supplemental interpretation like co-speech gestures
  - not at-issue
  - function like run-of-the-mill appositives

- **isolated**: behave like one-'appositives', i.e. they are assertive like stand-alone pro-speech gestures
  - at-issue
  - serve to clarify/specify a property of the speech DR; like one-modifiers (cf. Averitseva-Klisch's view on afterthoughts: clarify reference)
Some philosopher brought a bottle of beer.

↪︎ supplement: Some philosopher brought a bottle of beer, which was big.

↪︎ assertion: Some philosopher brought a bottle of beer, a big one.
empirical evidence

- **co-speech gesture not-at-issue:**

  A: *Maria bought Paula [extremely expensive jewelry] for her birthday.*

  B: *No, that's not true! She bought her a necklace!*

- **isolated post-speech gesture at-issue:**

  A: *Maria bought Paula [extremely expensive jewelry] for her birthday.*

  B: *No, that's not true! She bought her a necklace!*
Maria spends a lot of time in trains. She often said that she needs something so she can do her work on the trains.

A: *Maria bought herself a tablet to be more flexible with her work.*

B: *Why such a big one??*

A: *She is an illustrator. They use these huge tablets.*

A: *#Maria wants to/should buy herself a tablet to be more flexible with her work.*

B: *What? Tablet??*

A: *#She is an illustrator. They use these huge tablets.*
isolated post-speech gesture content does not project:

Maria spends a lot of time in trains. She often said that she needs something so she can do her work on the trains.

A: Maria bought herself a tablet \(\text{big}\) to be more flexible with her work.

[B: Why such a big one??

A: She is an illustrator. They use these huge tablets.]

A: Maria wants to/should buy herself a tablet \(\text{big}\) to be more flexible with her work.

[B: Why such a big one??

A: She is an illustrator. They use these huge tablets.]
empirical evidence

cospeech gestures pattern with 'real' appositives:

* Maria bought herself a tablet — oversized by the way — to be more flexible with her work.  
* Maria wants to/should buy a tablet — oversized by the way — to be more flexible with her work.

isolated post-speech gestures pattern with one-'appositives':

* Maria bought herself a tablet, an oversized one, to be more flexible with her work.  
* Maria wants to/should buy herself a tablet, an oversized one, to be more flexible with her work.
empirical evidence

coop-speech gesture content projects:

If you buy [a dog] you cannot stay in this flat.

A Chihuahua/a small dog would be ok, of course.

A dog of whatever size means leaving the flat (and the speaker's prototypical concept of a dog is that it is that big)

post-speech gesture content does not project:

If you buy a dog [big] you cannot stay in this flat.

A Chihuahua would be ok, of course.

A "serious"/big dog means leaving the flat
empirical evidence

coop-speech gestures pattern with 'real' appositives:

#If you buy a dog – big by the way – you cannot stay in this flat.
#A Chihuahua would be ok, of course.

isolated post-speech gestures pattern with one-'appositives':

If you buy a dog, a big one, you cannot stay in this flat.
A Chihuahua would be ok, of course.
empirical evidence

- Post-speech gestures are not possible in all configurations

  I love I-Pads. #But I would never buy a tablet.

- However, they are excluded whenever one-'appositive's would be excluded:

  I love I-Pads. #But I would never buy a tablet, a huge one.

- Contribution must involve a monotonic update.
  It has to be a specification and must not involve any revision.
outlook
pre-speech gestures & shifting
Schlenker (2017) defends a different view: he argues that the relevant distinction is between external and internal (syntactically (in)eliminable) enrichments. The former are not at-issue – even if they have a separate time slot –, the latter can be at issue or not.
More specifically, [on the righthandside, there will be (such) a pillar]^{+ic-g}. It doesn't fit the townscape at all.
dimension shifters

- whenever there are pieces of information from different dimensions or channels, they compete for the at-issue status
- there are certain defaults, but these can be overridden
- temporal sequence (within speech) and temporal alignment (of gesture and speech) has an effect on the default interpretation of the involved pieces
- **dimension shifters** shift information from one dimension to the other
Mimics as dimension shifter:

- Schlenker (2016): At-issue readings are derivable via local accommodation, because they are weak triggers, but in particular in contrastive contexts (cf. Esipova 2017)

*I did not bring [a bottle], I brought [a bottle].*
Mimics as dimension-shifter:

- Ebert & Ebert (2014): at-issue readings are generally not possible (cf. projection with negation)...
- ... EXCEPT with certain mimics (raising eyebrows, ...) and an eye-catching gesture (see also Esipova 2017)

I did not bring [a bottle], I brought [a bottle].

small
Examples not-at-issue → at-issue:

- mimics – raising eyebrows (previous slide), ...
- demonstratives – *ein* vs. *so ein* and *the* vs. *this* (Ebert & Ebert 2014)
- focus-marking/prosody/...
  
  *(He is not just an expert, he is THE expert)*

Examples at-issue → non-at-issue:

- 'comma' intonation
summary

- pieces of information from one or across different channels of communication compete for at-issueness
- a prime example is the interplay of gestural information and speech, where speech usually wins over gesture
- the status of gestures depends on their temporal alignment with speech (i.e. availability of a competitor)
  - stand-alone gesture → at-issue, cf. one-appositives
  - co-speech gesture → not-at-issue, cf. ordinary appositives
- there are means to switch and shift information between dimensions
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Thank you for your attention!
Literaturverzeichnis


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