

Diane Brentari*

Modality and contextual salience in co-sign vs. co-speech gesture

<https://doi.org/10.1515/tl-2018-0014>

Schlenker has done an excellent job of combining a number of different strands of recent work on sign languages in order to make a larger case that: (i) sign languages make logical form visible, and (ii) this logical visibility is made possible via iconicity. These two hypotheses are intertwined in ways that focus on the fundamental question concerning the boundary between language and gesture, both in signed and spoken languages. Schlenker is focusing on a specific kind of gesture in sign languages; his examples are selectively chosen to engage with gradient, iconic forms that might be considered co-sign gesture and that might have an obvious parallel with co-speech gesture. We can, therefore, ask how co-sign and co-speech gesture might differ from each other. Do sign languages have an advantage in its range of co-sign (vs. co-speech) gestures? In this commentary I will suggest some possible ways that there indeed might be a modality effect in gesture.

I will assume from the start that messages in both signed and spoken languages pair linguistic and gestural form. Goldin-Meadow and Brentari (2017) argue that instead of comparing sign vs. speech, a more fruitful comparison would be sign+gesture vs. speech+gesture. But do the gestural elements of signed languages have the same status as those of spoken languages? Schlenker does not take a stand on this issue in this paper and confines the examples in his target article to sign languages, and I raise issues in this paper that pertain to this next step in the work. It may be the case that if we include co-speech gesture in the analysis of spoken languages, the differences between the semantic resources available in signed and spoken language would disappear, or it could be that there are still differences.

A further question is whether we should limit our analyses to quintessential iconic, manual gestures, or should the scope of analysis include a broader range of forms—for example, prosody—or even some elements of the broader context. Context enrichment (Bott and Chemla 2016) is a term that can apply to all

*Corresponding author: **Diane Brentari**, Department of Linguistics, The University of Chicago, 1115 E. 58th Street, Rosenwald Hall, Chicago, IL 60637, USA, E-mail: dbrentari@uchicago.edu

elements that might potentially influence grammaticality judgments in ways addressed in Schlenker's article. I would suggest that the very nature of the relationship between language and context enrichment is pragmatically constrained, as Lascarides and Stone (2009) argue it is for gesture. They propose that there are coherence relations that hold between co-speech gesture and language; for example, elaboration, contrast, and explanation are common ways that the coherence relations are expressed. We can then ask how coherence relations might differ in signed vs. spoken languages.

I would agree with Schlenker's first hypothesis that sign languages make logical form visible, but I would agree even more strongly if the wording were altered to state that visually iconic, logical form may be *easier to find* in co-sign than co-speech gesture. Two reasons that could account for this difference are related to sign language experience, rather than to the languages themselves. Signers, particularly native signers, have more experience with the visual/gestural language medium, and are skilled at using the body and hands to communicate subtle differences in meaning on the fly, which is when gestures come into play (Lu and Goldin-Meadow 2017), and so: (i) the subtle differences produced on the hands and body may be more salient for signers than for speakers, and (ii) it may be that acquiring how to employ gestures effectively is actually a part of the sign language acquisition process. With regard to Schlenker's second hypothesis, I agree that visual iconicity gives sign languages this advantage, but I will also suggest other types of contextual enrichments that can modify the grammaticality judgments of signed and spoken language users in similar ways.

Hypothesis 1: sign languages make logical form visible. Schlenker introduces quite early in his target article the possibility suggested by Goldin-Meadow and Brentari (2017) that, instead of a sign language vs. speech comparison, the better comparison is to compare sign+gesture with speech+gesture; they argue for language and gesture as distinct parts of an integrated communicative message in both types of languages. Schlenker acknowledges that if we make this the relevant comparison, sign languages may not be as extraordinary as Hypothesis 1 proposes, but they would still be very important, since work on sign languages has helped to guide linguists towards considering gesture as an object of study. Schlenker concludes in section 7 that we need criteria for distinguishing linguistic from gestural form in sign languages, and that these criteria have yet to be developed. I would want to add that when, possible, these criteria should be broad enough to apply to signed and spoken languages. Goldin-Meadow and Brentari (2017) suggest several such criteria for distinguishing co-sign and co-speech gesture from language that are pertinent here. They are given in (1).

- (1) Criteria for distinguishing linguistic and gestural elements in signed and spoken languages
 - i) Linguistic elements in a string can have either hierarchical or flat structures; gestures elements in a string have only flat structures.
 - ii) Linguistic elements exhibit less individual variation than gestural units.
 - iii) Linguistic units exhibit less gradience than gestural units.
 - iv) Producers and receivers are typically less consciously aware of gestures than language.

The first three criteria imply that gestures *can only be interpreted with respect to the linguistic forms that they accompany*. The first two address cases where the gestural and linguistic forms are wholistic units—entire gestures in a message string. In spoken languages, the typical gestures on the hands and body accompanying speech; in sign language, they are wholistic gestures that break up strings of signs. These are easier to identify and analyze than units that are partially linguistic and partially gestural, which are addressed in the third criterion. The fourth criterion has to do with contextual salience to which we turn to in discussing Hypothesis 2. Each criterion is described briefly below.

While linguistic units may form hierarchical structures when they occur in a string, co-speech or co-sign gestures form only a flat structure. There is no hierarchy or recursivity in gesture strings. In language, clauses can be embedded in other clauses [S [XP+S]], but this kind of structure does not occur in strings of co-sign/co-speech gestures. Most of the time gestures occur once per clause, and one gesture does not embed within the meaning of another; they simply concatenate one after the other [G]+[G].

Linguistic units exhibit less individual variation than gestural units. Compared to linguistic elements, there is less consistency in gestures that are used for the same meaning. Duncan (2005) points to this type of variability in co-sign gestures in Taiwanese Sign Language. The signers she studied all used the same handshape to refer to a cat, but the ways in which the handshape was modified to indicate that the cat was crawling up a tight drainpipe varied across signers (co-sign gesture), and in just the same ways that hearing speakers vary their manual gestures when describing the same event (co-speech gesture). Sandler (2009) also observes the same type of variability across signers to distinguish gestural from linguistic facial expressions in Israeli Sign Language (ISL). For example, while ISL signers typically use narrowed eyes (i.e. squint) to consistently indicate “shared information” linguistically, this same facial expression can also be used as one of several different gestures to indicate the narrowness of the space inside a drainpipe.



Linguistic units exhibit less gradience than gestural units. This is a different type of variation than the type described in the previous section. In both co-sign and co-speech gestural gradience is a kind of flexibility that is anchored to a scaffold of systematicity, and this systematicity consists of the inventory and constraints of a phonological system. For vocal gestures Okrent (2002) pointed out that the lengthened vowel in *loooong* as a vocal gesture for intensity is possible because English does not employ a length distinction in vowels. In bimodal forms co-speech gestures are anchored to and occur within a particular time window around the pitch-accented syllable of a phrase (Nobe 1996; Loehr 2004, 2007; Brentari et al. 2013). This coordination in timing between the linguistic and gestural form is evidence of the anchoring of gestural elements to linguistic forms.

Likewise in the ASL examples for GROW (Schlenker, ex. 49) the gestural part is separable but anchored to the linguistic part. The stem consists of the *handshape* (both full hands begin closed and then open up), the *orientation* (the relation between the two hands is symmetrical), and *the direction of movement* (movement lateral & outward). Layered onto the phonological specifications of the stem are what Schlenker would call gradient, gestural, phonetic properties of movement, which capture meanings of the size of growth—small, medium, and large—and of speed of growth—normal vs. fast. This type of dual-purposed (linguistic+gestural) form is also argued for in the seminal piece by Emmorey and Herzig (2003), where the handshapes used for size and shape specifiers, a type of classifier, have both a morphological basis and a gestural overlay. This line of argumentation can be extended to “agreement” or “indicating” verbs in sign language, which also have both logical indices, or variables for agreement, and the imagistic, gestural forms which indicate specific values. Following Schenker’s proposal, therefore, the positions taken on agreement verbs by Lillo-Martin and Klima (1990) who use variables (or phi-features), and by Liddell (2003) who appeals to a gestural account, can be effectively united in a single account.

Gesture typically falls outside of awareness for both producers and receivers. Gestures are typically not ~~themselves~~ the focus of attention for either the producer or the receiver, which may be what gives gesture its cognitive traction. In Goldin-Meadow and Brentari (2017) we suggest that gesture accesses implicit, nondeclarative knowledge in learning that can ultimately be integrated with declarative knowledge.

However, even if visual, iconic gestures are available in signed and spoken languages, native signers may be more adept at producing and perceiving forms that incorporate a broader range of visual iconicity because of their experience with sign language. In other words, they know intuitively how specific

articulators of the body may be co-opted to express particular iconic meanings. There is some evidence that later-learners of ASL signers are less skilled at this than native signers even if they acquired the language at a relatively young age (Lu and Goldin-Meadow 2017). Learning how best to create a gestural overlay that works with the grammar may be part of the acquisition process of sign languages. I would suggest that this is one reason why the skilled use of gesture is valued so much in literary forms of sign language (Sutton-Spence 2005). In subsequent sections I will delve further into the claim that contextual enrichments can be more easily integrated into logical form if they occur in the same modality as the linguistic form.

Hypothesis 2: This logical visibility is made possible via iconicity. I agree that iconicity is an important way that that we build upon and expand on linguistic meaning, but it is not the only way. Context can become important in amplifying linguistic expressions in a wide variety of ways, and several types of contextual enrichments can alter the grammaticality judgments of speakers. Two are described in the sections that follow, and the notion of the contextual salience (Higgins and Bargh 1987) is then offered a possible additional relevant factor.

Prosody as enrichment

Prosody is expressed by loudness, length, and frequency (tones) in spoken languages, and there are parallels in sign languages, such as larger movements (loudness), longer signs (length), and faster acceleration (frequency). Prosody in signed and spoken languages can also be expressed via facial expressions (see Krahmer and Swerts 2007; Borràs-Comes et al. 2014; Brentari et al. 2013; Sandler 2012; and references therein). In this way use of prosody is a rich source of data that has many similar temporal cues, facial expressions, and body cues in signed and spoken languages that are used for similar purposes.

Prosody also has three distinct roles in the grammatical life of a signed or spoken language. First, prosodic structure is a *bona fide* component of the phonology, and varies from language to language; e.g. whether or not prominence in terms of pitch accent occurs at the beginning or end of a neutral phonological phrase (see Beckman and Venditti 2011). Second, prosody is expressive and related to the emotional disposition of speakers. This function is very similar in spoken and signed languages. Pendzich and Herrmann (2015) demonstrated that similar expressive and emotional meanings were attributed by both signers and nonsigners to photographs showing isolated facial expressions out of

linguistic context. Third, prosody is used to contribute important semantic distinctions in sentences that become evident in grammaticality judgments.

In spoken languages prosodic properties such as lengthening, heightening of frequency (pitch), as well as intensity (loudness) have also been shown to contribute important semantic distinctions. Consider the differences between the judgments of truth conditions for sentence pairs where prominence occurs on (a) the noun (*It looks like a zebra*) or (b) the verb (*It **looks** like a zebra*) (Tanenhaus et al. 2015). When sentence (a) is uttered participants tend to choose the picture of a zebra to match the utterance; when sentence (b) is uttered participants tend to choose the picture of a non-zebra. Other examples of prosody in grammar occur in Basque (Etxeberria and Irurtzun 2015) and Greek (Chatzikonstantinou et al. 2012), where prosody alone has also been shown to indicate scalarity—i.e. whether or not a scale is invoked—in sentences such as *Mary didn't pick any flowers* (nonscalar meaning) vs. *Mary didn't pick **any** flowers* (scalar meaning). It has also been shown in numerous sign languages that facial expressions can also have a broad range of grammatical functions. See Pfau and Quer (2010) and Sandler (2012) for a general discussion, and Herrmann (2015) for a crosslinguistic analysis of focus. What this shows is that prosody has been co-opted by logical form in both spoken and signed languages.

Non-linguistic context as enrichment

Some linguistic material can be ignored in ellipsis, as in *I gave an brief lecture yesterday, and I'll be giving one today too*, where the modifier *brief* can be ignored under ellipsis; the clause containing ellipsis may or may not mean that today's lecture is also brief. Certain aspects of non-linguistic context can have an effect on VP ellipsis as well. In an experiment conducted by Geiger and Xiang (2017) participants were asked to judge the interpretation of forms with VP ellipsis after a visual cartoon was introduced into the non-linguistic context. Modifiers for quantity were manipulated in the first clause: no antecedent (silence), an unmodified antecedent (*I want to buy \emptyset candy bars*), or a modified antecedent, (*I want to buy **five** candy bars*). These sentences were then followed by three cartoon conditions where information was increasing salient: no quantity information (i.e. father and child in a grocery store at the candy bar display), general quantity information (i.e. the individual candy bars visible on a shelf that could be counted), or specific quantity information (i.e. the candy bars were counted in a speech bubble in the cartoon). A phrase with ellipsis was then uttered by the father — *We can't!* — and participants were asked to judge whether

the VP ellipsis meant (a) no candy bars could be purchased, or (b) some candy bars could be purchased, but fewer than five. The results showed that the salience of the cartoon context had a significant effect on the grammaticality of forms with VP ellipsis; more speakers chose the (b) interpretation when the cartoon context contained specific quantify information. We can conclude therefore that the salience of even non-linguistic contextual cues can affect linguistic judgments in some instances.

Prosody and salience

Returning to prosody and gesture, one possibility is that visual enrichments are generally more salient in sign languages (or to signers); the notion of salience is multi-faceted, and would need to be fleshed out further, since it can relate to accessibility, novelty, contradiction (see Higgins and Bargh 1987). VP ellipsis may be used as a tool to determine whether expressive prosody is a part of the intended message as a kind of “question under discussion”, a type of salience. We can ask if the parallel English and ASL examples obtain the same judgments regarding the interpretation of sentences with ellipsis in (2)–(3). In these examples, an utterance is produced in an “excited” way using visual prosody (facial expression) in English (2) and ASL (3) in order to test the claim that facial expressions are more salient to signers. The excited manner in the co-speech gesture can be ignored in English (2b)—the meaning could be that John was simply pacing (not in an excited way)—but not in the¹ co-sign ASL (3b)—it is not possible to interpret JOHN NOT without also including *excited*.

- (2) Ellipsis targeting visual prosody as expressive content (English)
- Sylvester paced [facial expression: excitedly], ... 
- a. and John **did** [~~excited~~]¹ too. [verb]
- b. but John didn't [pace excited/~~excited~~] [verb+negation]
- (3) Ellipsis targeting visual prosody as expressive content (ASL)
- CAT PACE [FACIAL EXPRESSION: EXCITEDLY], AND...
- a. JOHN SAME [~~EXCITEDLY~~]. [verb]
- b. ?JOHN NOT [PACE EXCITED/~~?EXCITED~~] [verb+negation]

These different judgments in English and ASL would need to be tested more thoroughly, but if they are indeed different in the two languages, it suggests

¹ The words crossed out indicate that they are cases where these meanings are ignored.

that visual prosody may be treated differently in spoken vs. signed language. Why would this be the case? It could be a modality effect. The facial gestures in ASL occur in the same modality as the linguistic message and may therefore be more salient. This would then lead to a further prediction for English: *excited* should be harder to ignore when expressed via spoken acoustic than visual prosodic cues.

Iconic gestures, contextual enrichment and salience

Unlike the co-speech results obtained in (2), in silent gesture when nonsigners' attention is entirely directed towards facial expressions and not divided between visual and spoken prosody, they are able to use focus on facial expressions to make semantic pragmatic distinctions. In a study of the prosodic expression of imperatives, Brentari et al. (2018) found that if ASL sentences expressing commands, statements of permission, explanation, and advice via facial expressions only are shown to signers of ASL and German Sign Language (DGS) and to nonsigners (American and German), nonsigners and DGS signers can distinguish neutral sentences from imperatives, and identify commands by means of the ASL facial expressions equally well, even if the ASL signers perform significantly better than the other groups. The results from Strickland et al. (2015) might also be considered from the same perspective. Their study found that nonsigners were able to attribute telic and atelic meanings to forms produced with movements of the types identified by Wilbur (2010). In both of these studies, however, one would have to ask if nonsigners would be equally sensitive to these modifications of form if they occurred as co-speech gesture when the gestures are less salient because the speakers's attention was divided between the two modalities.

Iconic manual gestures are the central cases with which Schlenker is concerned in this paper. He argues that, for example, verbs containing loci include both formal elements that are therefore part of logical form—possibly “pure” variables or phi features—and iconic gestures that allow for nominal, temporal, modal and locative uses. Such gestures change the truth conditions, ellipsis properties, and in some cases the capacity of aspects of the utterance to be negated (see sections 4.3 and 4.4). We can also compare cases of VP ellipsis similar to those in (2)–(3) with Schlenker's example of GROW (ex. 49)—see the English example in (4) and ASL example in (5). Does VP ellipsis allow one to ignore the iconic enrichment? Preliminary judgments suggest that the two languages may behave differently, even more clearly than the prosodic examples in (2) and (3). In the English sentences (4b,c) the speed and size of growth can be ignored in the interpretation of ellipsis, but not in the ASL sentences in (5b,c).

- (4) VP Ellipses with iconic enrichments accompanying *grow* (English)
 His group is growing [Gesture: slow/fast; small/medium/large], ...
 a. and mine too [grow [slow/fast; small/medium/large; ~~Slow/fast; small/medium/large~~] too. [verb]
 b. but mine is not [grow [slow/fast; small/medium/large; ~~Slow/fast; small/medium/large~~] [verb+negation]
- (5) VP Ellipses with iconic enrichments accompanying GROW (ASL)
 POSS-3 GROUP GROW [slow/fast; small/medium/large], ...
 a. #AND MINE SAME [GROW [slow/fast; small/medium/large; #~~slow/fast; small/medium/large~~] too. [verb]
 b. #BUT MINE NOT[GROW [slow/fast; small/medium/large; #~~slow/fast; small/medium/large~~] [verb+negation]



Consider also the examples in (6)–(8), which are very similar to forms discussed by Schlenker (2015). Preliminary judgments indicate that in the English example in (6) the gesture showing the size of the beer can be ignored in the clause with VP ellipsis in English. In the parallel ASL example (7) the size cannot be ignored; interesting, when the speaker calls the listener's attention to the gesture in the English sentence in (8), containing the phrase *like this*, the size of the beer communicated via gesture cannot be ignored in the interpretation of ellipsis.

- (6) The philosopher brought a bottle of beer [Gesture: ] to the workshop, ...
 a. and George did [bring a ~~large~~ bottle of beer to the workshop] too.
 b. but George didn't [bring a ~~large~~ bottle of beer to the workshop].

- (7) PHILOSOPHER BRING BEERWORKSHOP [Gesture: ], ...
 a. #AND GEORGE SAME [bring a large/#~~large~~ bottle of beer to the workshop] too.
 b. #BUT GEORGE NOT [bring a large/#~~large~~ bottle of beer to the workshop].

- (8) The philosopher brought a bottle of beer **like this** [Gesture:



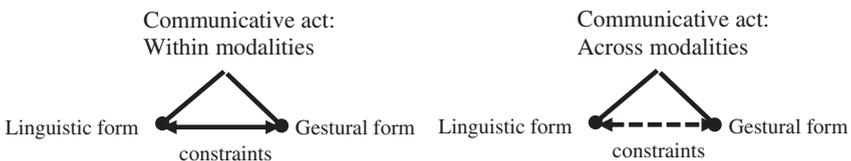
], to the workshop, ...

- a. and George did [bring a large/#large bottle of beer to the workshop] too.
 b. but George didn't [bring a large/#large bottle of beer to the workshop].

To conclude, besides iconic gesture, prosodic structure may be another form of contextual enrichment that might contribute to logical form in signed and spoken languages. An additional factor affecting all contextual enrichments may be salience; if one calls attention to the relevant property of, gesture, prosody, or context, it may make it more salient and therefore more easily incorporated into logical form.

Schlenker's paper goes to great lengths to point out that manual features of sign languages have parallels with spoken language grammars in syntax, morphology, and phonology, so that we can see that the gestural elements of sign language are bound up with the grammatical forms. Following insights about context enrichment (Bott and Chemla 2016) I suggested that the very nature of the gesture-language relationship is constrained by a set of contextual (possibly pragmatic) principles, as Lascarides and Stone (2009) argue. They propose there are coherence relations that hold between co-speech gesture and language. In this commentary whether or not an element of enrichment is to be included or excluded in logical form was considered, and how modality might play a role, which is tied to the notion of salience. I proposed one new principle having to do with salience and modality that may be useful—i.e. *when co-sign or co-speech gesture occurs within the same modality, the likelihood of being included in logical form is enhanced. The reverse is also true: when co-sign or co-speech gesture occurs in a different modality, the tendency to include elements in logical form is diminished.* This is schematized in (9)

- (9) Modality constraint for likelihood of inclusion in logical form within and across modalities



The prediction would then be that vocal gestures using spoken prosody (e.g. *looong*) would be integrated into logical form more easily than manual gestures in spoken languages, and iconic manual gestures would be more easily integrated into logical form in sign languages. I have also suggested that part of the knowledge that all language users possess includes principles by which bits of context may and may not be included in logical form. The bits of context need not be linguistic, *per se*; but the set of principles that do the work to integrate them into logical form is part of the grammar.

References

- Beckman, Mary & Jennifer Venditti. 2011. Intonation. In John Goldsmith, Jason Riggle & Yu Alan (eds.), *Handbook of Phonological Theory, 2nd Edition*, 485–532. London: Blackwell.
- Borràs-Comes, Joan, Constantijn Kaland, Pilar Prieto & Marc Swerts. 2014. Audiovisual correlates of interrogativity: A comparative analysis of Catalan and Dutch. *Journal of Nonverbal Behavior* 38. 53–66.
- Bott, Lewis & Emmanuel Chemla. 2016. Shared and distinct mechanisms in deriving linguistic enrichment. *Journal of Memory and Language* 91. 117–140.
- Brentari, Diane, Giovanna Marotta, Ilaria Margherita & Angela Ott. 2013. The interaction of pitch accent and gesture production in Italian and English. *Studi e Saggi Linguistici* 51(1). 81–102.
- Brentari, D., J. Falk, A. Giannakiou, A. Herrmann, E. Volk, and M. Steinbach. 2018. Production and Comprehension of Prosodic Markers in Sign Language Imperatives. *Frontiers in Psychology: Language Sciences (Special Issue on Visual Language)*. doi: 10.3389/fpsyg.2018.00770.
- Chatzikonstantinou, Tasos, Anastasia Giannakidou & Despoina Papadopoulou. 2012. Negative polarity items and quantifiers in Greek: Evidence from 6 year olds. 33rd Annual Meeting of the Department of Linguistics, Greece: Aristotle University Thessaloniki.
- Duncan, Susan. 2005. Gesture in signing: A case study from Taiwan sign language. *Language and Linguistics* 6(2). 279–318.
- Emmorey, Karen & Melissa Herzig. 2003. Categorical versus gradient properties of classifier constructions in ASL. In Karen Emmorey (ed.), *Perspectives on classifier constructions in signed languages*, 221–246. Mahwah, NJ: Lawrence Erlbaum Associates.
- Etxeberria, Urtzi & Aritz Irurtzun. 2015. The emergence of scalar meaning. *Frontiers in Psychology* 6141–153. 10.3389/fpsyg.2015.00141.
- Geiger, Jeffrey & Ming Xiang. 2017. Ellipsis in context: Identity and salience both drive interpretation. Presentation at the 30th annual CUNY conference, MIT, March 30–April 1, 2017.
- Goldin-Meadow, Susan & Diane Brentari. 2017. [Target article] Gesture, sign and language: The coming of age of sign language and gesture studies. *Brain and Behavioral Sciences*. 40. doi: 10.1017/S0140525X15001247.
- Herrmann, Annika. 2015. The marking of information structure in German Sign Language. *Lingua* 165. 277–297.
- Higgins, E. Tory & John Bargh. 1987. Social cognition and social perception. *Annual Review of Psychology* 38. 369–425.

- Krahmer, Emiel & Marc Swerts. 2007. The effects of visual beats on prosodic prominence: Acoustic analyses, auditory perception and visual perception. *Journal of Memory and Language* 57. 396–414.
- Lascarides, Alex & Matthew Stone. 2009. A Formal Semantic Analysis of Gesture. *Journal of Semantics* 26. 393–449.
- Liddell, Scott. 2003. *Grammar, gesture and meaning in American sign language*. Cambridge, UK: Cambridge University Press.
- Lillo-Martin, Diane & Edward Klima. 1990. Pointing out differences: ASL pronouns in syntactic theory. In Susan Fischer & Patricia Siple (eds.), *Theoretical Issues in Sign Language Research, Volume 1: Linguistics*, 191–210. Chicago: The University of Chicago Press.
- Loehr, Daniel. 2004. *Gesture and Intonation*. Washington, DC: Georgetown University dissertation.
- Loehr, Daniel. 2007. Aspects of rhythm in gesture and speech. *Gesture* 7. 179–214.
- Lu, Jenny & Susan Goldin-Meadow. 2017. Combining categorical and gradient information in sign and spoken communication. 11th International Symposium on Iconicity in Language and Literature, Brighton, UK: University of Brighton, 6–8 April.
- Nobe, Shuichi. 1996. *Representational gestures, cognitive rhythms, and acoustic aspects of speech: a network threshold model of gesture production*. Chicago, IL: University of Chicago PhD dissertation.
- Okrent, Arika. 2002. A modality-free notion of gesture and how it can help us with the morpheme vs. gesture question in sign language linguistics, or at least give us some criteria to work with. In Richard Meier, David Quinto-Pozos & Kearsy Cormier (eds.), *Modality and structure in signed and spoken languages*, 175–198. Cambridge: Cambridge University Press.
- Pendzich, Nina-Kristin & Annika Herrmann. 2015. Nonmanual actions at the interface between gesture and sign. Presentation at the Nonmanuals at the Gesture Sign Interface Workshop, Göttingen: Georg-August-Universität Göttingen, Oct. 9–10, 2015.
- Pfau, Roland & Josep Quer. 2010. Nonmanuals: Their grammatical and prosodic roles. In Diane Brentari (ed.), *Sign Languages: A Cambridge Language Survey*, 381–402. Cambridge, UK: Cambridge University Press.
- Sandler, Wendy. 2009. Symbiotic symbolization by hand and mouth in sign language. *Semiotica* 174. 241–275.
- Sandler, Wendy. 2012. Visual prosody. In Roland Pfau, Markus Steinbach & Bencie Woll (eds.), *Handbook of sign language linguistics*, 55–73. Berlin: Mouton de Gruyter.
- Schlenker, Philippe. 2015. *Co-suppositions and Gesture Projection*. Presentation at the Center for Gesture Sign and Language. Chicago, IL: University of Chicago, May 2015.
- Strickland, Brent, Carlo Geraci, Emmanuel Chemla, Philippe Schlenker, Meltem Keleşir & Roland Pfau. 2015. Event representations constrain the structure of language: Sign language as a window into universally accessible linguistic biases. *Proceedings of the National Academy of Sciences of the United States of America* 112(19). 5968–5973.
- Sutton-Spence, Rachel. 2005. *Analysing Sign Language Poetry*. London: Palgrave Macmillan.
- Tanenhaus, Michael, Chigusa Kurumada & Meredith Brown. 2015. Prosody and intentional recognition. In Lynn Frazier & Edward Gibson (eds.), *Explicit and Implicit Prosody in Sentence Processing: Studies in Honor of Janet Fodor*, 99–118. New York: Springer.
- Wilbur, Ronnie. 2010. The semantics–phonology interface. In Diane Brentari (ed.), *Sign Languages: A Cambridge Language Survey*, 355–380. Cambridge, MA: Cambridge University Press.