

What belongs in the “logical core” of a language?  
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A response to Schlenker, P.: “Visible Meaning: Sign Language and the Foundations of Semantics”  
Target article to appear in *Theoretical Semantics* (<http://ling.auf.net/lingbuzz/002447>)

**Abstract**

Schlenker argues that sign languages can provide unique contributions to a theory of natural language semantics primarily due to their *logical visibility* and *iconicity*. I focus on the latter claim that in sign languages, “**iconic phenomena can be found at their logical core**”, and suggest instead that many iconic aspects should be modeled not as core linguistic semantic phenomena, but rather as the integration of language with other cognitive processes like reference tracking, depiction, and action imitation. It may be the case that concepts conveyed via extra-linguistic means will occasionally contribute to meaning in sign languages with a different assertive status than in spoken languages, possibly due to pragmatic rules that are sensitive to whether content is expressed in shared vs. separate modalities (Schlenker 2016). However, without more compelling evidence, we should continue to at least pursue the hypothesis that spoken languages and sign languages share a logical core in their natural language semantics, and treat iconic contributions similar in the semantics of both sign and speech plus gesture.

**Intro**

Cognitive scientific approaches to the study of language are relatively young, and younger still are the comparison between the psychological representations of speech and sign. However, early within sign language linguistics (Stokoe 1960) and psycholinguistics (Bellugi & Fischer 1972, Klima & Bellugi 1979) it became clear that sign languages share fundamental structural and psychological properties with speech: sublexical structure, morpho-syntactic structure, information density, neural processing networks, and patterns of acquisition. At the same time, psychological approaches to the study of gesture have found that the visual-manual modality provides complementary contributions to speech, and that co-speech gesture and speech are tightly interconnected systems (McNeil 1992, Goldin-Meadow 2005). Given this view of gesture cognition, the notion that sign languages (with their accompanying gestures) should be compared to the combination of speech plus co-speech gesture seems like a natural one (Liddell 1996, Emmorey & Herzig 2003, Goldin-Meadow & Brentari 2017). It also finds empirical support: in addition to several monolingual ASL cases mentioned in Goldin-Meadow and Brentari’s (2017), parallelism between some (gestural) signs and (co-speech) gestures is found in the “code blended” language of sign-speech bilinguals, who sometimes produce vocal gestures (e.g. “bzzz”) simultaneously with certain iconic signs (classifier predicates), further support for a gestural component in these signs (Quadros, Davidson, Lillo-Martin, & Emmorey 2017). The issue of gesture in sign languages bears on the semantic treatment of iconicity in sign languages because most formal semanticists have not been tempted to treat the meaningful, depictive aspects (the “content”) of manual gestures or vocal gestures (e.g. “bzzzz”) within the linguistic system, despite their structural integration with speech. Rather, their content is

usually seen as arising not through specifically linguistic cognitive processes, but either through a general cognitive architecture, or specific processes that are nonlinguistic.

Schlenker argues that sign languages go beyond the combination of speech plus gesture to include iconic phenomena differently in their “logical core”. On the one hand, it is evident that iconic phenomena are pervasive in signed language, and perhaps are closer to the “heart” and “art” of sign more than speech, so to the extent that “universal semantics” includes any meaning that is conveyed in sign, it may indeed need to encompass more than we typically attribute to semantics in spoken language. However, Schlenker seems to intend something deeper by this hypothesis, arguing that the very constraints available in natural language semantics need to be broader for sign languages than for spoken languages, and of a different nature due to these iconic phenomena. In contrast, here I will push back against the claim that in sign languages, as compared to spoken languages, “iconic phenomena can be found at their logical core”.

### *On the modularity of natural language semantics*

The question of what belongs in the “logical core” of a natural language depends both on one’s view of language within general cognition, and the role of a formal semantics within a linguistic system. Formal semanticists ground their models of meaning in a logic which is meant to capture the combinatorial and infinite nature of potential linguistic meaning. To the extent that these models actually reflect the nature of the psychological processes involved, it is considered to be an advantage, but (just as in models of syntax) processing evidence is usually secondary in evaluating a model after ensuring accurate empirical coverage of possible and impossible interpretations, and valid and invalid resulting inferences. That said, semantics has occasionally engaged with questions about what aspects of meaning are contributed by other cognitive systems, as in number cognition when it comes to number word meanings, mass/count distinctions and object categorization, modals and possibilities, kinds and classes, attitudes reports and theory of mind, lexical semantics and concepts, and perceptual salience and anaphora resolution. In several cases, information about nonlinguistic cognitive systems has sometimes informed the design of semantic theory, and may even play a role in affecting inferences that speakers draw, but would be unlikely to be considered the “logical core”.

The issue of a “logical core” more broadly opens up questions about the modularity of language, where traditional opposing views either take language to involve just the same kind of cognitive processes found in other domains (a non-modular view) or take there to be some cognitive processes that are specific to language and others that are outside of the domain of language (a modular view). By classifying a wide variety of iconic phenomena in sign languages as within their logical core, Schlenker’s approach of a “universal semantics” could be viewed as a twist on these traditional perspectives of modularity, in which a broader range of meaning is modeled based on the kind of cognitive processes that we see in language. This is interesting especially if they are specifically taken to have an expressive capacity that goes beyond the sort of meaning proposed in a Fodorian (1980) Language Of Thought approach to cognition.

An important question underlying Schlenker’s hypothesis, then, is how to determine the “logical core” of a language, and whether all, some, or no iconic phenomena in sign languages, speech, and/or gesture belong there. On the one hand, an investigation into what naturally forms a language’s logical core should

not presume that spoken languages are the right place to start; in a sign language centered approach it seems possible that a rigorous semantics originally created for sign languages would have subsequently turned to spoken languages and found them relatively impoverished at their logical core. However, I suggest that it is also quite possible that even starting with sign languages, a rigorous semantics may have been created that was highly integrated with other cognitive systems of action imitation, depiction, reference tracking, and deixis, and then in a subsequent comparison, spoken languages would be found not so much weak at their logical core, but rather less highly integrated with other powerful cognitive systems, especially when discounting contributions from co-speech gesture. In fact, it is possible that something like this is what has led to seemingly higher proportional representation by cognitive linguists within sign linguistics than spoken language linguistics. The goal here is of course not to abandon the significant advances of a logic-based formal semantics to focus entirely on general cognitive processes involved in sign, but rather understand how they combine and thus what is modeled by the logic. One way to think about how other systems interact with a compositional semantics that models truth conditions is that the semantics can provide a point of entry for other kinds of representations, either through direct reference or predication, by which it may affect truth conditions. This may not lead to a blanket argument against the possibility of iconic linguistic rules, nor a strict discrete=language/ analog=gesture dichotomy, since it is easy to imagine discrete nonlinguistic representations (e.g. object files), and there may well be some linguistic processes that are analog, but I do want to suggest that of several iconic phenomena that have been a focus in sign language research, a more conservative step would be to view their contributions as arising from non-linguistic specific cognitive processes.

### *Sign language Loci*

Setting aside the separate “logical visibility” issue of whether sign language loci are overt instantiations of variable indices, Schlenker also argues that loci require (unique to sign language) interpretive rules that incorporate iconicity. Instead, I suggest that much of this content arises through their deictic nature. Consider first that for seemingly all of the ways that loci are used abstractly in arbitrary signing locations (participating in verb agreement, with a pronominal form *IX*, markers of possession and location, etc.) the same can be done with locations in space where a referent is physically present (e.g. truly deictic uses of *IX*, verb agreement with a physically present object, etc.), and frequent accounts in sign linguistics have tried to combine the two into one integrated system (for a recent example, see Cormier, Fenlon, & Schembri 2015). Even from the point of view of spoken languages we know there are expressions with both anaphoric and deictic uses, including demonstrative pronouns (Ahn 2017), so it’s no surprise that demonstratives have been compared to *IX* in ASL (Koulidobrova & Lillo-Martin 2016). Crucially, while linguists have reasonably considered elements with deictic uses (e.g. *that*, *he*) to be linguistic in that their lexical entries encode the possibility of deixis (which may also be true for the sign *IX*), their actual reference resolution (determination of exactly who, real or imagined, is pointed out) is usually outside of the domain of a logical semantic system. There are at least two additional iconic properties of loci that Schlenker focuses on that he claims go beyond simple reference determination, however: inferences people make about properties of referents assigned to loci based on iconic uses of spatial height (as in “tall” basketball players) and the ways in which inferences are made about plural loci due to their the spatial alignment (including the availability of “complement set anaphora”). However, instead of building iconic interpretation functions directly into the linguistic semantics, an alternative is to consider the

inferences that arise through these mechanisms to relate to the deictic uses of loci. Both of these two uses of abstract loci arise also in deictic loci: it is possible (both in ASL and in English) to point to an actually tall person, and to point to one set that encompasses another. Not all uses of height with loci occur with normal deixis (see discussion of Davidson & Gagne below, which only affects abstract loci), but a compelling account of these kinds of iconicity in abstract anaphoric loci could begin to tie it into the processes by which these same inferences arise in non-abstract/deictic loci, relying on things like object recognition, intention, depiction, and reference tracking.

### *Classifiers*

Another source of iconicity in sign languages are classifier predicates (“depicting signs”). In these verbs, the handshape parameter morphologically marks a discrete class of nouns (Zwitserslood 2012) while at the same time comprehension studies suggest that aspects of their movement and location parameters are interpreted in an analog/continuous way (Emmorey & Herzig 2003). As Schlenker notes, two recent formal semantic proposals implement some form of iconicity essentially as an obligatory manner modification (Zucchi 2011, Davidson 2015). Under such a view, classifier signs involve a *predicate of demonstration* between two events, the communicative event and another event. For example, in a classifier predicate representing an upright human being, the path and manner information contained in the sign’s movement is interpreted as demonstration those same aspects of path and manner in another event. Importantly, this leaves the question of the accuracy of a demonstration of an event as outside of semantics, in the same way that verification of any other lexical predicate like “teacher” (i.e. who counts as a “teacher”) is left outside compositional semantics. Some movements may be interpreted as meaningful, and others as not meaningful, depending on several factors, many of which seem to be related to general heuristics for understanding action imitation and depiction, but are not directly encoded in a semantic rule of composition that specifies how physical properties of the sign map iconically to meaning.

To extend the discussion to a broader array of phenomena, consider three examples mentioned by Schlenker: the verb GROW, the verb PLAY-PIANO, and the spatial arrangement of several trophies (plural marking). In ASL, all can be modified iconically to provide addition manner information about the event, and are perfectly amenable to the classifier analysis in Davidson (2015). What may be crucially different between these and the combination of English speech and gesture is that co-speech gestures of the sort GROW[gesture of growing] do not seem to have the same affect on truth conditions that the same movement does in the ASL sign: in speech it seems that they are typically not at issue (Ebert & Ebert 2014, Schlenker 2017), while this seems to be more easily the case in ASL. This may be a modality pragmatic difference between sign and speech, and a promising avenue for analysis is given in Schlenker 2016, which proposes pragmatics rules sensitive to whether content is expressed in shared vs. separate modalities. However, it still seems unclear that these iconic pieces belong in the logical core of the language; just because they can affect truth conditions doesn’t mean that their reference is determined within the linguistic system. Obvious examples with content outside of the linguistic system that nevertheless affect truth conditions are deictic expressions in English, e.g. *grow like this*, *play piano like this*, *trophies set out like this*. As we said above, these have different assertive status than either co-speech gesture without a demonstrative pronoun or their counterparts in ASL, but still, it seems that their content may come about the same way. The resolution of these deictic expressions (their referential content) can

be a question for other areas of cognition about how those heuristics work: perhaps demonstrations of actions work in a similar way to the pictorial semantics that has already been suggested based on linguistic methods (Greenberg 2013). Alternatively, perhaps they are completely different, in a way that may or may not involve mental representations of the sort we think of as necessary for language. To bring empirical evidence to bear on the nature of these representations questions will require clever experimentation that can separate the analog from the very complex discrete, on top of their levels of discourse contribution, but the point is that it seems that whatever should account for this kind of communication need not fall within the logical core of language.

### *Role shift*

Schlenker views sign language role shift as an example that primarily bears on the issue of *logical visibility*, taking it to be an overt realization of a semantic operation that changes the context of evaluation for context-sensitive items/indexical expressions. As in all other cases of logical visibility, though, it raises issues for *iconicity* as well. Attention within the semantics of indexicals has focused on crosslinguistic flexibility with respect to which indexicals can be evaluated with respect to a “shifted” contexts, and in each potential case how to definitively separate context shift from quotation (Schlenker 2004, Anand & Nevins 2004). As Schlenker notes, sign languages provide clear cases of indexicals with seemingly shifted interpretations, but it is difficult to separate tokens of them from potential analyses of quotation given that results of typical tests of syntactic integration are consistent with a quotative analysis. Maier (this volume, 2017) and Davidson (2015) discuss the arguments in favor of a type of quotative analysis for role shift that reports dialogue and other attitude reports, with Maier’s proposal bringing them even more in line with quotation in spoken languages, providing an overall picture that makes (at least ASL) sign language role shift ill-suited to be the poster child for visible context shift.

Schlenker himself agrees that a more compelling argument from sign languages for visible context shift comes from what he calls *action role shift*, which falls under the larger category of *constructed action* (see detailed BSL corpus work by Cormier, Smith, & Sevcikova-Sehyr 2015 on the variety of types of constructed action). With action role shift, then, one finds a case that is clearly not quotation, since it simply reports an action, yet aspects of the report are interpreted iconically. However, it’s not at all clear that this iconic part needs to be conveyed through special semantic rules. In previous work (Davidson 2015), I have suggested that action role shift can be modeled within a formal semantic system instead as a “body classifier” obligatory event modifier, where processes like action depiction and imitation, along with pragmatic constraints, determine the accuracy of the event modifier. For role shift, it also seems that a system of reference tracking by which we can determine which are the *same* and *different* actors and participants in a dialogue may play a role in how several iconic aspects of both attitude and action role shift get involved in interpretation.

### *Spatial mappings of time and magnitudes*

Finally, as the third example of both proposed logical visibility and iconicity, Wilbur’s (2008) “Event Visibility Hypothesis” has highlighted a pattern in which many sign language verbs with telic interpretations (a semantic event structure with a boundary point) are also pronounced such that their

form has a clearly defined boundary point (e.g. sudden stop in motion, change in handshape). The same pattern is reported in several sign languages, and even adults without any exposure to a sign language have been argued to pick up on this systematicity, guessing at somewhat above chance levels the meaning of nonce signs they don't know based on telicity (Strickland, Geraci, Chemla, Schlenker, Kelepir, & Pfau 2015). While recent work suggests that the strong version of this hypothesis does not hold up across broader categories of verbs in ASL, there does seem to be some relationship between telicity and form in an iconic direction, such that when verbs can alternate in form, a form with a boundary point has a telic interpretation (Davidson, Kocab, Sims, & Wagner 2017). Should this iconicity be modeled in the "logical core" of the language? As with iconicity in loci, classifiers, and role shift, the same pattern appears repeatedly across sign languages, and if there is some tendency also for non-signers to pick up on the same directionality, one suspects that general cognitive processes are at play (Strickland 2016). What is seen here goes beyond depiction, deixis, or imitation, although it fits in perfectly with frequently reported (but still ill-understood) cognitive tendencies for abstract mappings between time and space (Lakoff & Johnson 2008).

A structurally similar example of iconicity that may be also mediated by nonlinguistic processes in sign languages is the use of height for larger quantities, argued to be the basis for domain restriction (Davidson & Gagne 2014) or specificity (Barberà 2012). As with "event visibility," any iconicity here is abstract, involving a use of space to represent magnitude of a linguistically relevant sort. Nevertheless, again this same use of height is used across unrelated sign languages and even among non-signers in their gestures (Durkin, Gagne, & Davidson 2016). Like event visibility, this use of iconicity by non-signers is initially surprising if it is a language specific semantic rule, but if the linguistic rule is itself blind to iconicity, and iconicity rather comes in through nonlinguistic cognitive pressures for tying together two related domains (here, spatial extent and cardinality magnitude, see: Taub 2001), we would not be surprised find the distribution of lexical items in ASL that we do, and the use of space for abstract quantity that we do.

### *Conclusions*

My working assumption has been that the rules outlined in Schlenker are meant to be specific to language given that Schlenker is contrasting sign languages with spoken languages in terms of what is in their "logical core", but certainly this need not be the case. Purely by the nature of Schlenker's term "universal semantics," the door seems open to semantics of other systems, and so using language-like rules to model the iconic aspects of communication in other mediums may turn out to be apt. However, when we go to these domains, I maintain that it is important for semanticists in their role as cognitive scientists, if that is part of how they view their work, to consider what kind of non-linguistic models of proposed cognitive representations might be better suited to other systems. Schlenker mentions modularity in the context of whether there should be a separate "iconicity" module, but it's unclear whether this, too, is intended to be specific to language or communication broadly. This debate engages with deep questions about the nature of representation in cognition generally, whether based on mental models, deductive inference or something else, and whether or not those used in language are shared by other systems. Theories of meaning, and cognitive representation generally, might reasonably question whether all relevant representations are digital, or some analog. One empirical way to get at this is to design studies to test whether speakers/gesturers and signers represent analog information conveyed in utterances as more

complex, which would suggest that it is represented underlyingly as discrete, or whether variations in analog information follow a constant (imagistic) complexity pattern that we might expect if cognitive representations are truly analog, and whether that pattern is found in other nonlinguistic domains.

It is possible that Schlenker's "twist" on modularity with language as a starting point for investigating structure elsewhere in cognition will lead to an interesting kind of universal semantics in which similar rules are used in both linguistic and nonlinguistic domains. However, the goal of this response is to highlight the issue of semantic modularity that arises in claims about iconicity being in the "logical core" of sign languages. Instead, I suggest that we need not model their contributions to semantics through iconicity specific rules but rather through linguistic rules of the sort we already have that depend on the output of, or interaction with, other nonlinguistic cognitive processes. Under this view, the *frequency* of iconic phenomena in sign languages is due to a linguistic system more pervasively integrated with other aspects of cognition, rather than a fundamentally different or more complex linguistic system. This bears especially on the question of whether sign languages should be modeled as speech plus gesture: gesture in speech seems to play a more subservient role in information structure, which may be due to the fact that it doesn't share the same modality used for assertions in the language. However, that doesn't mean that the semantic *content* of iconic gesture and the *content* of iconic signs are need to arise in different ways, and in fact a reasonable starting point may be an analysis in which their content arises through well known cognitive processes of depiction, imitation, reference tracking, etc. Instead of placing iconicity at the "logical core" of a language, sign languages, like spoken languages when gesture is also included, may instead highlight the fluidity with which we are able to integrate language with other cognitive systems.

## References

- Ahn, Dorothy. (2017). Semantics of definite descriptions: A micro-typology. Talk at GLOW in Asia XI, Singapore. February 20-22, 2017.
- Anand, P., and A. Nevins. (2004). Shifty operators in changing contexts. In *Proceedings of Semantics and Linguistic Theory (SALT) XIV*, ed. by Robert B. Young, 20–37. Ithaca, NY: Cornell University, CLC Publications
- Barberà Altimira, G. (2012). The meaning of space in Catalan Sign Language (LSC). Reference, specificity and structure in signed discourse.
- Bellugi, U., & Fischer, S. (1972). A comparison of sign language and spoken language. *Cognition*, 1(2), 173-200.
- Cormier, K., Fenlon, J., & Schembri, A. (2015). Indicating verbs in British Sign Language favour motivated use of space. *Open Linguistics*, 1(1), 684-707.
- Cormier, K., Smith, S., & Sevcikova-Sehyr, Z. (2015). Rethinking constructed action. *Sign Language & Linguistics*, 18(2), 167-204.
- Davidson, K. (2015). Quotation, demonstration, and iconicity. *Linguistics and philosophy*, 38(6), 477.
- Davidson, K., & Gagne, D. (2014). Vertical representation of quantifier domains. In *Proceedings of Sinn und Bedeutung* (Vol. 18, pp. 110-127).
- Davidson, K., Kocab, A., Sims, A. D., and Wagner, L.. (2017). Telicity Encoding in American Sign Language: Testing the Event Visibility Hypothesis. Talk at LSA 2017, Austin, TX. January 5-8, 2017.
- Durkin, A., Gagne, D., and Davidson, K. (2016) "English speakers and American Sign Language (ASL) signers extend the MORE IS UP to subset/superset relationships for quantification," presentation at International Society for Gesture Studies, Paris, July. 18-22.
- Goldin-Meadow, S. (2005). *Hearing Gesture: How Our Hands Help Us Think*. Harvard University Press.

- Goldin-Meadow, S., & Brentari, D. (2015). Gesture, sign and language: The coming of age of sign language and gesture studies. *Behavioral and Brain Sciences*, 1-82.
- Greenberg, G. (2013). Beyond resemblance. *Philosophical review*, 122(2), 215-287.
- Ebert, C. & Ebert, C.. (2014)., Gestures, Demonstratives, and the Attributive/Referential Distinction. Handout of a talk given at Semantics and Philosophy in Europe (SPE 7), Berlin, June 28, 2014.
- Emmorey, K., & Herzig, M. (2003). Categorical versus gradient properties of classifier constructions in ASL. *Perspectives on classifier constructions in signed languages*, 222-246.
- Fodor, J. (1980). *The language of thought*. Harvard University Press.
- Klima, E. and U. Bellugi. (1979). *The signs of language*. Harvard University press.
- Koulidobrova, E., & Lillo-Martin, D. (2016). A 'point' of inquiry: The case of the (non-) pronominal IX in ASL. *The impact of pronominal form on interpretation*, 221-250.
- Lakoff, G., & Johnson, M. (2008). *Metaphors we live by*. University of Chicago press.
- Liddell, S. K. (1996). Numeral incorporating roots & non-incorporating prefixes in American Sign Language. *Sign Language Studies*, 92(1), 201-226.
- McNeil, D. (1992). *Hand and Mind: What Gestures Reveal about Thought*. University of Chicago press.
- Maier, E. (same volume). Quotation, Demonstration, and Attraction in Sign Language Role Shift
- Maier, E. (2017). The pragmatics of attraction: Explaining unquotation in direct and free indirect discourse
- Quadros, R. Davidson, K., Lillo-Martin, D., & Emmorey, K.. (2017). Depicting Signs in Bimodal Bilingual Code-Blending. Talk at FEAST Reykjavik. June 21-22.
- Schlenker, P. (2017). Gesture Projection and Cosuppositions. Manuscript. <http://ling.auf.net/lingbuzz/002645>
- Schlenker, P. (2016). Iconic Pragmatics. Manuscript. <http://ling.auf.net/lingbuzz/003215>
- Schlenker, P. (2003). A plea for monsters. *Linguistics and philosophy*, 26(1), 29-120.
- Stokoe, W.C. (1960). Sign language structure: An outline of the visual communication system of the deaf *Studies in Linguistics*, University of Buffalo, Buffalo, New York (1960), p. 78 Occasional Paper 8
- Strickland, B. (2016). Language Reflects "Core" Cognition: A New Theory About the Origin of Cross-Linguistic Regularities. *Cognitive science*. Chicago
- Strickland, B., Geraci, C., Chemla, E., Schlenker, P., Kelepir, M., & Pfau, R. (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*, 112(19), 5968-5973.
- Taub, S. F. (2001). *Language from the body: Iconicity and metaphor in American Sign Language*. Cambridge University Press.
- Wilbur, R. B. (2008). Complex predicates involving events, time and aspect: Is this why sign languages look so similar. *Theoretical issues in sign language research*, 217-250.
- Zwitzerlood, I. (2012). Classifiers. In R. Pfau, M. Steinbach, and B. Woll, *Sign Language: An International Handbook*. De Gruyter Mouton, 158-185.
- Zucchi, S. (2011). Event descriptions and classifier predicates in sign languages. In Presentation at the meeting of the Venice FEAST Conference, Venice, Italy.