One limitation the authors face in extending their model in the directions they indicate – where gesture and sign form an integrated system that conveys meaning – is their emphasis on an information-based and internal approach to cognition. This approach does permit powerful modeling and in-depth consideration of how imagistic and categorical types of information might play out in linguistic cognition. However, language – as an integrated system – extends beyond internal cognition, as recent work on language evolution and neurobiology indicates (Christiansen & Chater 2008; Evans & Levinson 2009). Recognizing how cognition works in the wild (Hutchins 1995) through more interactive, extended, and embodied models (Clark 2008) might offer a starting point for achieving the authors' overall goals. Subsequently, to more fully consider the social, political, and cultural side of language learning, G-M&B could utilize recent work in neuroanthropology, which integrates cognitive science with anthropology and related fields (Lende & Downey 2012a; 2012b). For example, the concept of language readiness might be transformed by considering it not just in terms of individual readiness, but also through the embodied acquisition of gestures and signs in specific situations and specific times (Downey 2010). The social practices that differentiate gesture and sign would then shape, at a fundamental level, how categorization works within the brain (Roepstorff et al. 2010).

Accordingly, we suggest that the authors could extend the presentation of their research by recognizing that signing is a skill best learned and promoted in social settings. In communities of practice, members learn through mutual engagement, joint enterprise, and (particularly germane to this discussion) a shared repertoire (Wenger 1998). In other words, the concept of communities of practice brings together context, sociality, and meaning, to emphasize the interactivity of language and socialization (Pfister 2015b). Only by attending to the dynamics of skill within a community of practice is it possible to understand how gestures paired with signs may convey meaning differently. The authors miss this crucial aspect of language by promoting an overly formulaic "communicative act" that they suggest consists of only imagistic and categorical formats. Research among deaf youth who experience language socialization among signing peers in Mexico City has provided an example of how community participation and sociality cannot be divorced from understanding (Pfister 2015a; 2015b; 2015c; in press; Pfister et al. 2014). We argue that the social components of language influence meaning making because the context, sociality, and shared experience conveyed within communities of practice factor heavily into better understanding, and researching further, G-M&B's emphasis on the "whole of a communicative act" (sect. 8, para. 2).

Finally, we understand that the authors' aim is not to equate sign with gesture, but instead to establish the role of gesture when paired with sign language. Yet, early in the target article, they draw our attention to recent history when signs were considered "nothing more" than gestures. Recognizing the important status of signed languages as legitimate forms of human language, we caution of the potential danger in sign languages becoming too closely associated with gesture once again. We challenge readers to consider how the consequences of such an association might affect the political economy of sign language. This is seen most clearly in educational settings, where some languages are valued, elected, and funded (i.e., spoken languages), while others are simultaneously devalued, discouraged, and underfunded (i.e., signed languages). In Mexico, for example, sign language is often misunderstood to be mimicry (*mímica*), which is not gesture, per se, but nonetheless occupies a position precariously distant from bona fide language. Mexican educational policy is influenced by oralist and inclusion ideologies, and public schools are not mandated to provide an education accessible to deaf students in Mexican Sign Language. Thus, as in many parts of the world, sign language is not readily accessible for many deaf Mexicans (Pfister 2015a; 2015b; 2015c). Language readiness among deaf learners, therefore, is social and political as well as cognitive.

Are gesture and speech mismatches produced by an integrated gesture-speech system? A more dynamically embodied perspective is needed for understanding gesture-related learning

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Abstract: We observe a tension in the target article as it stresses an integrated gesture-speech system that can nevertheless consist of contradictory representational states, which are reflected by mismatches in gesture and speech or sign. Beyond problems of coherence, this prevents furthering our understanding of gesture-related learning. As a possible antidote, we invite a more dynamically embodied perspective to the stage.

The complexity of demarcating speech, sign, and gesture is elegantly surveyed in the target article. The analysis promises to be a valuable roadmap for research in multimodal communication. However, we doubt whether the analysis – as currently presented – achieves one of its other goals, that is, to enhance our ability to make "predictions about learning" (para. 5).

Goldin-Meadow & Brentari (G-M&B) argue that regardless of whether information is expressed via the manual or vocal system, a distinction should be made between speech/sign and gesture on the basis of whether categorical or imagistic representations are underlying their expression. This distinction should help explain gesture-related learning, such that mismatches between gesture *and* speech or sign (and their correlation with learning) are driven by "distinct representational formats – a mimetic, imagistic format underlying gesture versus a discrete, categorical format underlying language, sign, or speech." (sect. 6, para. 14).

Yet we observe that there is a tension in the target article in that it also stresses an "integrated," "single," and "unified" gesture-speech system (sect. 5 & 6). In the case of learners who are producing mismatches in gesture and speech, it is argued "that [the] mismatch is generated by a single gesture-speech system" (sect. 5, para. 15). G-M&B argue that, although learners are unaware of the mismatches they produce, the fact that they are more receptive to learning after they produced mismatches suggests a unified system: "if gesture and speech were two independent systems, the match or mismatch between the information conveyed in these systems should have no bearing on the child's cognitive state" (sect. 5, para. 12).

Unfortunately, in their overview we see no clear arguments (other than stating the case) for resolving the apparent logical contradiction of positing two representational devices (categorical vs. imagistic) that differ and contradict in their informational content (as reflected by gesture and speech mismatches) but are nevertheless part of an integrated system.

Beyond problems of coherence, this contradiction is potentially problematic for understanding learning. Note that learning

fundamentally involves a change in the cognitive system. Further note that G-M&B make no attempt to specify how the imagistic information that is supposedly accessed by gesture (and not speech/or sign) is potentially transformed and fed back into the system (cf. Goldin-Meadow 2003a; Pouw et al. 2014). If gestures do not transform the cognitive system but are only reflective of its underlying imagistic representation, then mismatches reflect that the gesture-speech system is disintegrated (hence the contradiction). Moreover, G-M&B see the fact that mismatches have bearing on the child's cognitive state as evidence for a unified system, but they fail to account for how the gesture producing the mismatch has any causal force in changing the cognitive system (i.e., how it predicts learning). In other words, the current account begs the question: Why do gesture and speech mismatches have a bearing on the child's cognitive state if gestures reflect information that is already integrated?

What is the alternative? Insights from embedded and embodied cognition challenge the idea that action should be regarded as the mere output of the cognitive system (e.g., Hurley 2001). Such insights have been applied to gesticulation (Cappuccio et al. 2013; Clark 2013; Pouw et al. 2014). If these accounts are on track, the cognitive system is distributed over brain and body, wherein any state that this distributed brain-gesture system enjoys is brought about by loops of circular causation of perception and action (Clark 2013).

Such approaches can be brought in line with G-M&B's proposal that gesture can access distinct information that is not available to speech. Yet it requires rethinking in which way this distinct information is "accessed" and believed to be "present" in an underlying "representation," and relatedly to which degree this information is integrated with the speech system. As mentioned, G-M&B's current presentation fosters a static understanding of gesture wherein mismatching gestures merely access and output imagistic information. From a more dynamically embodied perspective, gesturing may bring forth imagistic information that is not in any cognitively potent way present in an underlying representation before the act of gesturing. From this perspective, gestures add something to the neural precursors from which they emerge. Namely, gesturing adds kinematic information that is being fed back through the visual and proprioceptive system (Pouw et al. 2014).

In sum, we think a more complete account of gesture-related learning requires the specification of how a gesture-speech system integrates incongruent information that is brought forth by the act of gesturing rather than assuming that this information is already integrated. In pursuit of such an account, we support G-M&B's call to develop more sophisticated measures to assess kinematic regularities expressed in gesture, as this allows researchers to further pinpoint what, in the act of gesturing, it is that is cognitively potent for learning. For example, problem solvers have difficulty in judging verbally when cups of different sizes spill water, but they drastically improve when they are allowed to gesture (Schwartz & Black 1999). It is likely that this performance is dependent on the ability to correctly physically enact the laws that govern the task (which involves being sensitive in gesticulation to relevant properties of the objects gestured about, such as the size of the cups, and rotational inertia). Possibly, the kinematic invariants that are present in such gestures may become more stable over time as expertise develops, and it may be the case that such increasing kinematic regularities are predictive for the susceptibility for categorical integration in speech (e.g., Chu & Kita 2008). We thereby submit that understanding learning from gesture-speech mismatches at least requires specifying how gesture's emergent kinematic regularities (i.e., embodied information) related to the learning task becomes categorizable (and thus transformed) through time, as well as understanding how this affects the potentiality of integration with speech.

Vocal laughter punctuates speech and manual signing: Novel evidence for similar linguistic and neurological mechanisms

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Abstract: Vocal laughter fills conversations between speakers with normal hearing and between deaf users of American Sign Language, but laughter rarely intrudes on the phrase structure of spoken or signed conversation, being akin to punctuation in written text. This *punctuation effect* indicates that language, whether vocal or signed, is dominant over laughter, and that speech and manual signing involve similar mechanisms.

Conversations between speakers with normal hearing and between deaf users of American Sign Language (ASL) are filled with vocal laughter, but the placement of laughter in these vocal and manual conversations is not random. The *speaker* – the person sending a vocal or signed message – typically laughs before and after complete statements and questions, seldom interrupting phrase structure. Thus, a speaker may say or sign, "I have to go now – ha-ha," but rarely, "I have to – ha-ha – go now." The placement of laughter in vocal or signed conversation is akin to punctuation in written text and is termed the *punctuation effect* (Provine 1993; 2000; 2016; Provine & Emmorey 2006). Observations of conversational laughter reveal common features of speaking and signing beyond punctuation. For example, in both hearing speakers (Provine 1993) and deaf signers (Provine & Emmorey 2006), males are the best laughgetters (Provine 1993), and most laughter does not follow humor (Provine 1993). For hearing and deaf people, the essential requirement for laughter is playful social relationships, not jokes or other attempts to stimulate laughter (Provine & Fisher 1989).

Punctuation has significant neurolinguistic implications. Laughter rarely intrudes on the phrase structure of spoken (Provine 1993) or signed conversation (Provine & Emmorey 2006), indicating that language, whether vocal or signed, is dominant over laughter. When laughter competes with speech/signing during conversation, language usually wins. Punctuation is also present in the visual domain of text, a nonvocal linguistic medium. Emoticons (visual symbols of emotion such as LOL, "Laughing Out Loud," etc.) seldom disrupt phrases in online text messages (Provine et al. 2007). Emoticons occur in positions like this ☺. But not ☺ like this. Unlike the case of speech and laughter that involves competition for the vocal tract, neither manual signing nor text messaging competes with laughter for a shared organ of expression. The presence of punctuation across this diverse range of expressive behaviors (speaking, signing, texting) indicates that it is the product of a higher-level neurolinguistic mechanism, not a lower-level gatekeeping mechanism that regulates motor acts competing for an organ of expression such as the vocal tract.

Punctuation is not unique to laughter in speech, signing, and texting, indicating the generality of the effect. Airway maneuvers other than speech show punctuation and the priority of linguistic over other forms of expression. Speech involves breath-holding and redirecting the respiratory apparatus to vocalizing. People either speak or breathe during conversation, with breaths coming at linguistically significant punctuation points similar to those described for laughter (McFarland 2001). (It is not known whether breathing punctuates signing.) This complex respiratory, vocal, and linguistic choreography occurs automatically; we do not consciously plan when to breathe, talk, or laugh. Significantly, laughter is under weak voluntary control. When asked to laugh on command, most individuals comment