Original Articles

Successful communication does not drive language development: Evidence from adult homesign

Emily M. Carrigan *, Marie Coppola

University of Connecticut, United States

ABSTRACT

Constructivist accounts of language acquisition maintain that the language learner aims to match a target provided by mature users. Communicative problem solving in the context of social interaction and matching a linguistic target or model are presented as primary mechanisms driving the language development process. However, research on the development of homesign gesture systems by deaf individuals who have no access to a linguistic model suggests that aspects of language can develop even when typical input is unavailable. In four studies, we examined the role of communication in the genesis of homesign systems by assessing how well homesigners' family members comprehend homesign productions. In Study 1, homesigners' mothers showed poorer comprehension of homesign descriptions produced by their now-adult deaf child than of spoken Spanish descriptions of the same events produced by one of their adult hearing children. Study 2 found that the younger a family member was when they first interacted with their deaf relative, the better they understood the homesigner. Despite this, no family member comprehended homesign productions at levels that would be expected if family members co-generated homesign systems with their deaf relative via communicative interactions. Study 3 found that mothers' poor or incomplete comprehension of homesign was not a result of incomplete homesign descriptions. In Study 4 we demonstrated that Deaf native users of American Sign Language, who had no previous experience with the homesigners or their homesign systems, nevertheless comprehended homesign productions out of context better than the homesigners' mothers. This suggests that homesign has comprehensible structure, to which mothers and other family members are not fully sensitive. Taken together, these studies show that communicative problem solving is not responsible for the development of structure in homesign systems. The role of this mechanism must therefore be re-evaluated in constructivist theories of language development.

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1. Introduction

The process by which children come to be mature members of a linguistic community has long been a subject of developmental research. Valian (2014) specifies four key components of a model of language development[1]: First, the initial state of the child (or endowment); second, the end-state of the language system—that is, the nature of the adult language system; third, the mechanism by which the learner transitions from the initial state and the end state, and fourth, the role played by any input the child receives. Although these can be (and are) studied independently, comprehensive theories of language development must address each component. In particular, any specification of the mechanism by which children acquire language must necessarily depend upon the conceptualization of the initial state, and the role of the input (as 'ingredients' to be used by the mechanism). Thus, in attempting to determine how mechanisms of language development operate, it is useful to precisely specify what these 'ingredients' are.

1.1. Language via 'target-matching' and 'communicative problem solving'

Constructivist theories of language development hold that children acquiring a language build linguistic representations on the basis of the input they receive (e.g., Ambridge & Lieven, 2015; Tomasello, 2000, 2009). Crucially, the construction of linguistic representations is accomplished through interactions with individuals who have fully developed language systems.

One constructivist account of language acquisition, known as a functionalist, or usage-based perspective, emphasizes the importance of communication as a mechanism of language development

(e.g., Bates & MacWhinney, 1982; Goldberg, 2006; Tomasello, 2000, 2007, 2009). These accounts define communication as interactions between individuals whose functional goal is the successful transmission of a message. Further, they suggest that in the 'end state' of language development, the learner matches the structure in the input or target language (we refer to this as 'target-matching'). Target-matching is accomplished via social interactions with more mature users of the target language (Tomasello, 2007). The more closely the learner's linguistic representations match the target language, the more successful communication will be.

Some strongly functionalist perspectives suggest that the specific forms of language have evolved in close relation with their communicative function (described, for example, in Bates & MacWhinney, 1982). Such perspectives hold that the form of a particular linguistic feature may be "inevitable" (Bates & MacWhinney, 1982, p. 178) given its communicative function as well as learner-internal and learner-external constraints on its emergence. Accordingly, the acquisition or construction of these linguistic forms results from children's attempts to solve particular communicative problems (like the need to understand what people around them are saying, e.g., Goldberg, 2006). Communicative problem solving is thus the means by which the child acquires the structure of the target language and achieves successful communication. As children age, their linguistic representations become increasingly abstract and independent of the context in which they are acquired (e.g. Ambridge & Lieven, 2011). Thus, once children have developed linguistic representations that fully match the target language, they are able to produce utterances that can be understood based solely on the linguistic signal.

Language and communication generally go hand-in-hand in the language-learning situation, and are difficult, if not impossible, to separate. In the vast majority of instances, in which the child has access to a target language, target-matching and communicative problem solving provide reasonable explanations of the mechanisms driving language acquisition. However, it is not clear that these mechanisms can account for the development of language structure under all circumstances, especially those in which a language model, or target, is absent.

1.2. Language emergence reveals mechanisms of language development

Along with a number of researchers from various areas of the study of language (e.g., Goldin-Meadow, 2003; Kiparsky, 1968, 2014; Senghas & Coppola, 2001) we argue that cases of present-day language emergence—the emergence of linguistic structure in the absence of linguistic input—parallel the language acquisition process. Both involve the development of complex linguistic representations using the language-learning mechanisms available to all humans. Given the similarities between language emergence and language acquisition, it is unparsimonious to posit different mechanisms for each phenomenon.

However, cases of present-day language emergence pose a challenge to these mechanisms. Both the target-matching and communicative problem solving explanations for language development in constructivist accounts assume that children receive language input that is structured, regular and complex. However, there exist situations in which individuals are exposed to input that is inaccessible, unstructured, or entirely absent—namely, the development of homesign systems.

Homesigners are situated at the intersection of acquisition and language emergence. Initially, they are young enough for their acquisition mechanisms to operate, but no input is available to feed those mechanisms. Goldin-Meadow (2015) argues that the natural variability in the input characteristic of these present-day

cases of language emergence make them a unique means of teasing apart the learner-internal and learner-external contributions to language development.[2]

If 'communicative problem solving' is the primary means by which humans construct language, it should play a role in the development of linguistic structure in homesign systems. In the present paper, we evaluate whether this mechanism plays a role in the development of linguistic structure in four homesign systems used by adult deaf individuals in Nicaragua. Again, the term 'linguistic structure' encompasses morphophonological, morphological, lexical, and syntactic features of language—in the next section we review the evidence that homesign systems contain these features.

1.3. Homesign: Language without structured input

The cases of de novo genesis of language-like systems examined here occur in deaf individuals who are born free of cognitive and social impairments, and who can thus be considered typically developing. They are born into hearing, non-signing families who do not have access to early intervention or special education services for deaf children. Thus, they have little access to signed or spoken linguistic input. These individuals nevertheless develop and use systems of manual gestures, called "homesign," to use with their hearing family members (see Goldin-Meadow, 2003 and Morford, 2003 for reviews of work on homesign systems in childhood and adolescence).

Homesigners are unable to hear the spoken language around them, and are not exposed to conventional sign language; they also do not learn to read Spanish. Thus, their only input is what they can visually perceive of the hand, facial, and body gestures produced by the hearing people around them. Such gestures typically accompany speech, and do not contain independent linguistic structure (e.g., Goldin-Meadow, McNeill, & Singleton, 1996; Singleton, Morford, & Goldin-Meadow, 1993). This suggests that homesigners receive non-linguistic input, on which they then impose linguistic structure. Work with child homesigners shows that the gesture input they receive from their mothers is less patterned than what the deaf children themselves produce (e.g., Goldin-Meadow, Butcher, Mylander, & Dodge, 1994; Goldin-Meadow & Mylander, 1984, 1990).

Nevertheless, child and adult homesign systems exhibit many of the features of fully developed languages, such as basic syntax and morphology (e.g., Goldin-Meadow, 2003), hierarchical structure and complex phrases (Hunsicker & Goldin-Meadow, 2012), the grammatical relation of subject (Coppola & Newport, 2005), proto-pronouns (Coppola & Senghas, 2010), devices for expressing quantity (Coppola, Spaepen, & Goldin-Meadow, 2013), devices for establishing reference (Coppola & So, 2005) and emerging morphophonological and morphosyntactic regularities (Brentari, Coppola, Mazzoni, & Goldin-Meadow, 2012; Coppola & Brentari, 2014). Such research indicates that homesign is systematic and productive, and functions as a linguistic system.

1.4. Target-matching does not drive homesign development

The evidence discussed above (Goldin-Meadow & Mylander, 1984, 1990; Goldin-Meadow et al., 1994) shows that target-matching cannot account for the development of linguistic structure in homesign. Firstly, homesigners do not receive any fully

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[2] While such natural experiments of language deprivation are highly informative regarding theories of language and cognitive development, the consequences of language deprivation are negative for the individuals who experience it. Researchers must do everything in their power to increase awareness about and reduce the occurrence and severity of language deprivation (Humphries et al., 2014).