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# Is displacement possible without language? Evidence from preverbal infants and chimpanzees

Valentina Cuccio and Marco Carapezza<sup>1</sup>

*Is displacement possible without language? This question was addressed in a recent work by Liskowski and colleagues (Liskowski, Schafer, Carpenter, & Tomasello, 2009). The authors carried out an experiment to demonstrate that 12-month-old prelinguistic infants can communicate about absent entities by using pointing gestures, while chimpanzees cannot. The main hypothesis of their study is that displacement does not depend on language but is, however, exclusively human and instead depends on species-specific social-cognitive human skills. Against this hypothesis, we will argue that a symbolic representation is needed to intentionally communicate absence and that this symbolic representation is tied to language. Moreover, data on the expression of displacement in home-sign systems will be taken into consideration. In light of this data, and in opposition to Liskowski et al.'s (2009) claim, this paper will argue that displacement gestures are not foundational to language. Instead, they predate and predict the expression of complex forms of negation because they are specifically foundational to them.*

*Keywords: Displacement; Negation; Prelinguistic Infants' Gestures*

## 1. Introduction

Displacement is a distinctive feature of human language. We currently do not have any proof that displacement is possible without language. That is to say, we are not certain that any animal other than man uses an intentional communication system with displacement, even if there seems to be evidence that nonhuman primate vocalizations (Seyfarth & Cheney, 2003) or bees' dances (Von Frisch, 1967) might intentionally communicate about an absent referent. However, empirical evidence suggests that

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these examples do not demonstrate that chimpanzees or bees have the intention of communicating about absent entities.

In the case of primate vocalizations, the vocalization is a reaction to the presence of a predator; these vocalizations, as well as other non-vocal primates' signals, appear to be involuntary responses to emotional states. They cannot be considered as intentional signals even though they successfully communicate the cause of the primate's emotional state, i.e., the presence of a predator. Moreover, the repertoire of these vocalizations is fixed, no new vocalizations can be learned (Cartmill, Beilock, & Goldin-Meadow, 2012; Cartmill & Maestripieri, 2011; Snowdon & Hausberger, 1997).

In the case of the bees' dance, this behavior does not seem to involve an intentional attempt to direct others' attention to an absent referent because honeybees do not seem to have any capacity for inferential intention recognition, even though their dance successfully transmits information to others (Wharton, 2009; Wilson & Wharton, 2006). The bees' dance is also a highly fixed and unambiguous code that can be considered an example of an information transmission system without communicative intentions.

Thus, these examples of non-vocal primates' signals and bees' dances suggest that non-intentional communicative signals can be detached from the here-and-now context. However, these signals cannot be considered examples of intentional communication. Hence, displacement, defined as the intentional detachment from the here-and-now context for communicative purposes, seems to be exclusively human. Other forms of non-intentional displacement will not be addressed here since this paper is strictly focused on the expression of displacement in intentional communicative behaviors.

Is displacement, considered as an expression of intentional communication, possible without language? This question was addressed in a recent work by Liszkowski, Schafer, Carpenter, and Tomasello (2009). The authors carried out an experiment to demonstrate that prelinguistic infants can communicate about absent entities by using pointing gestures, while chimpanzees cannot. Indeed, in the task given in this study, prelinguistic infants and chimpanzees could obtain a desirable object (toys or food) by requesting it from the experimenter. Requests were carried out by pointing to the object. In the absent-referent condition, the location that usually had held the object was empty. Prelinguistic infants successfully acquired the object by pointing to the empty location. Only the infants were able to point to the empty location to request the object. The authors interpreted these pointing gestures as expressions of displacement. The main hypothesis of the study is that displacement does not depend on language but is exclusively human and, instead, depends on species-specific social-cognitive human skills.

In response to Liszkowski et al.'s hypothesis, we claim that a symbolic representation is needed to intentionally communicate absence, and that this symbolic representation is tied to language. Metonymy, a specific kind of symbolization, seems to be particularly at play here. Infants are representing the content (the object) through the container (the empty location that had held it). Thus, language seems to be necessary to express displacement. Moreover, even if the infants of Liszkowski et al.'s study are

said to be preverbal, it is worth noting that they are 12-month-old children. They may not yet be speakers, but being preverbal is not the same as being prelinguistic. In other words, a 12-month-old infant can already show linguistic features in his or her communication even if he or she is not yet able to speak verbally.

Even though 12-month-old infants are usually not active speakers, they already have a high level of language comprehension. Liskowski et al. (2009) do not consider the well-known fact that linguistic measurements based on production largely underestimate the real level of linguistic comprehension (Adamson, 1996; Benedict, 1979; Bloom, 2000; Ganea, 2005; Goldin-Meadow, Seligman, & Gelman, 1976; Huttenlocher, 1974; Ninio, 1993; Saylor & Baldwin, 2004; Woodward, Markman, & Fitzsimmons, 1994). In addition, the authors do not take into account studies on infant comprehension of displaced speech. These studies have largely shown that infants are already able to comprehend displacement expressions in spoken language around their first birthday (Gallerani, Saylor, & Adwar, 2009; Ganea, 2005; Ganea & Saylor, 2012; Huttenlocher, 1974; Osina, Saylor, & Ganea, 2012; Saylor, 2004).

In order to assess the hypothesis that displacement gestures do not depend on language, it follows that Liskowski et al.'s concepts of linguistic and prelinguistic communication must be understood. Although the authors do not offer any explicit definition, some definitions would be essential to identifying the boundaries between what is linguistic and what is not linguistic. In a recent paper by Liskowski, Brown, Callaghan, Takada, and de Vos (2012), the authors propose a list of distinctive and species-specific features of human prelinguistic gestural communication. These features should define what counts as prelinguistic communication. For each of them, the authors claim that direct empirical evidence has been provided.

According to the authors, prelinguistic pointing gestures in 12-month-old infants predict first-word onset and vocabulary growth as reliably as the onset of syntactic two-word combinations (and, importantly, in 12-month-old infants, pointing gestures are already combined with words in one-gesture and one-word combinations). Moreover,

prelinguistic infants of 12 months of age point in meaningful ways, based on social-cognitive skills and motivations; . . . 12-month-olds point to communicate about specific entities and events, even when these are absent from the perceptual scene; . . . before infants produce point-word combinations, they comprehend the underlying referential nature of these combinations, and it is the specific canonical form of index-finger pointing (as opposed to whole-hand pointing) that first embodies a bidirectional understanding of the underlying communicative intentions of the act. (Liskowski et al., 2012, p. 2)

Considering that the gestures of 12 month-old-infants have many defining characteristics of language, and that they carry out functions that will be later carried out in language (syntactic combinations, meaningfulness and reference based on socio-cognitive abilities, mutual identification of communicative intentions, displacement), what is, then, really new and specific about language? Prelinguistic communication already shows most of the defining traits of linguistic communication, and this makes the task of identifying the boundaries between linguistic and

prelinguistic communication quite difficult, in particular at the onset of intentional communicative behaviors. On the basis of this evidence, we might even be able to question whether it is possible to identify a sharp boundary between linguistic and prelinguistic communication when dealing with 12-month-old children growing up in a linguistic and symbolic world without giving any measure of their level of linguistic comprehension.

Looking carefully at the Liszkowski et al. (2009) study, in the authors' view, the boundary between linguistic and prelinguistic communication can be distinguished through the use of conventional "tools." However, we will see that abstract pointing gestures can be considered the result of an agreement between interlocutors and, as such, they can be considered, to a certain extent, arbitrary and conventional.

The symbolic and arbitrary nature of this gesture is based on the peculiar relationship that it entails. A triadic relationship between the gesture (the representamen or sign), the interpretation of the sign (the interpretant), and a third entity not present in the scene (the toy) is entailed by the gesture studied by Liszkowski et al. Thus, this relationship is neither iconic nor indexical but arbitrary in nature. In fact, there is neither similarity (iconic relationship) nor physical contiguity (indexical relationship) between the displacement gesture and the toy as the toy is not present in the scene. The relationship between the gesture and the toy is arbitrarily established, in this case on the spot, by the child and the experimenter. The abstract pointing gesture signifies the absent toy only because it is interpreted as such. If, following Liszkowski et al. (2009), the use of conventional means delimits the boundary between linguistic and prelinguistic communication, then the abstract pointing gesture can be considered conventional in the sense that it is neither iconic nor indexical but arbitrary and conventional, because it is the product of a form of agreement between two interlocutors. The conventionality of language relies on this kind of relationship. Furthermore, the expression of signs that rely on this relationship is already a manifestation of linguistic communication, even before the onset of speech production.

Moreover, the peculiar symbolic nature of this gesture does not rely only on the arbitrary relationship that it entails. In fact, as Deacon (1997) has pointed out, arbitrariness cannot be the only feature of symbolic representation. The nature of symbolic reference also relies on the relationship between signs in a system. That is, the symbolic relationship between a sign and its referent is mediated by the relationship between that sign and the other signs of that system. Furthermore, symbolic reference is also hierarchically built on the structure of iconic and indexical relationships (Deacon, 1997; Huttenlocher & Higgins, 1978). Now, if we return to the gestures produced in Liszkowski et al.'s (2009) study, we can observe that the abstract pointing that occurs in the absence of its physical referent (the toy) becomes a representation of the concrete pointing that occurred when the object was present. Thus, we can only interpret the abstract pointing gesture through its reference to the previous concrete pointing. Hence, the relationship between the abstract pointing and its referent (the absent toy) is mediated by the relationship between the abstract pointing and the previous concrete pointing. The indexical relationship is recoded and now requires a

higher level of interpretation. For this reason, displacement gestures seem to be symbolic (Peirce, 1868).

On the other hand, animal communication systems, even when they are intentional, are not arbitrary, and do not entail systematic relationships between the signs of a system. Sign systems in animal communicative behaviors do not have any space for negotiation, nor are they the product of a mutual agreement between sign users.

Thus, the only conclusion we can draw from studies on infant gestural communication is that concrete deictic pointing gestures, that are not yet symbolic since they are indexical and have a relationship of physical contiguity with objects, are incontrovertible evidence of a prelinguistic gestural basis for linguistic intentional communication. However, this same conclusion cannot be drawn in relation to abstract pointing gestures. Indeed, when we are dealing with symbolic gestures, as the case seems to be for displacement gestures, we are already beyond the boundary of language. So, the question to pose to Liszkowski et al. (2009) is why a word can count as language and a gesture cannot, even though a symbolic representation seems to underlie both of them. A definition of what counts as a symbolic gesture will be provided in the next section.

## **2. Symbolic Gestures**

Different types of gestures, fulfilling different functions, have been observed. Roughly, they can be classified into at least three main types: deictic; representational; and pragmatic gestures (Özçalışkan & Goldin-Meadow, 2009; Pizzuto & Capobianco, 2005). Deictic gestures, such as pointing, are used to identify objects in the immediate environment and usually rely on contextual information. That is, the referent is present in the utterance context and it is necessary to introspect this context to disambiguate the gesture's meaning. For this reason, Pizzuto and Capobianco (2005) argue that deictic gestures are not yet symbolic. It may be said that this kind of gesture fits the Peircean description of indexes. In fact, it is characterized by a physical contiguity between the gesture and its referent.

On the other hand, the authors assert that representational gestures are symbolic, independently of their iconic, metaphoric, or conventional origin, because they are "content-loaded"; that is, they have an intrinsic meaning, and rely on shared background knowledge between producer and comprehender to be interpreted. While conventional gestures are culturally specific and stored in a gestural lexicon, iconic and metaphoric gestures are usually generated on the spot (Cartmill et al., 2012).

Adapting the Pizzuto and Capobianco (2005) definition of representational gestures to the aims of this paper, only a "content-loaded" gesture that has an arbitrary and conventional relationship between itself, its referent, and its interpretant will be considered as symbolic. This relationship has to be established by means of a usage-based process of mutual identification of communicative intentions. That is, the sign signifies its referent only because it is interpreted to signify it, and importantly, the interpretation of the sign relies on its relationship with the other signs of the system.

Finally, pragmatic gestures are produced to stress the interaction between participants, to structure the discourse, or to perform speech acts.

In light of this revised classification, the basic definition of symbolic gesture that has been proposed here also holds true for abstract deictic gestures, namely deictic gestures such as pointing, used to indicate something not physically present in the context of speech. Abstract deictic gestures can be used to “show” a concept, a relationship, a point of view, or an abstract property, and they can be used metonymically. For example, we can point to a man to refer to an idea in which that man believes or we can point to an object to refer to an abstract property referable to that object. We can also point to a location to refer to what that location has previously held, like the infants did in the Liszkowski and colleagues’ study. These gestures entail a conventional relationship, even though they do not rely on fixed couplings between signs and their referent.

It is worth noting that even in “highly conventional” spoken languages, the semantic level alone, i.e., the pre-fixed conventional coupling of words and referents, is not sufficient to succeed in communicative exchanges. The distinction proposed by Grice (1969; Gibbs, 2002) between *what is literally said* and *what is implicated* by the utterance of a sentence in itself suggests that semantics and compositionality rules are not sufficient to understand linguistic activity. A second pragmatic step of language comprehension seems to be necessary. In this account, symbolic communication is arbitrary and conventional in its nature, but the arbitrary relationship does not need to be highly coded and pre-fixed. The arbitrary relationship is built in the context of utterance, being always the result of a pragmatic process (Barlow & Kemmer, 2000; Carapezza & Biancini, forthcoming). Moreover, these communicative processes do not necessarily entail consciousness. On the contrary, according to Sperber and Wilson (1995) they are mostly implicit and unconscious.

Imagine two friends that meet in a pub. The first sees the other and says, “hey, I did it!” and the other answers: “congratulations.” This conversation can only be understood by someone who shares the same background knowledge as the participants. For example, the man could have gotten married or could have divorced, could have gotten a new job or could have quit his old one ... and so on. In each different context, the very same words would have a very different meaning. However, these words are not less arbitrary nor less symbolic for this reason. Thus, even “content loaded” words or gestures need to be pragmatically determined, the arbitrary relationship being built or re-built in every context of utterance. We don’t have symbolic signs without this agreement. Abstract deictic gestures seem to have the same needs, consequentially making them far more complex than concrete deictic gestures.

Conventional and highly standardized couplings between words and gestures, on the one hand, and their referents, on the other, are higher products of this same ability to symbolize. Symbolic communication in gesture is the early expression of this species-specific ability. Hence, symbolic gesture should be thought of as the early manifestation of language, with language understood as a multimodal system (Kendon, 2004; McNeill, 1992, 2005) that includes gestures and non-manual behaviors as meaningful units. Considering that the displacement gesture of very

young infants can be characterized by the same features that characterize symbolic representations in adult linguistic communication, it does not seem correct to say that they do not rely on language. Although they might not rely on pre-fixed conventional semantics, they still seem to rely on linguistic skills.

### 3. Methodological Issues

In addition to the considerations provided in the previous section, we also wish to make some methodological remarks about the Liszkowski et al. (2009) study. It is worth noting that the pieces of evidence that will be discussed in this section can be considered as independent arguments in support of the claim that displacement gestures rely on language, and they may be appealing to readers who are not satisfied with the definition of symbolic gesture sketched earlier.

The first objection that can be raised against Liszkowski et al.'s (2009) hypothesis is that, despite the fact that the infants in the study are said to be preverbal, no measures of their verbal abilities, either in production or in comprehension, are reported by the authors. Even if the 12-month-old infants of the study were not yet active in language production, they could have already had (and probably did have) a good level of language comprehension. Indeed, when 12-month-old infants use pointing gestures to refer to an absent entity, they already show a good level of language comprehension.

For example, Caselli, Rinaldi, Stefanini, and Volterra (2012) recently collected and analyzed data about early action/gesture vocabulary and its relationship with spoken vocabulary in both the production and comprehension of 492 Italian children with an age ranging from 8 to 18 months. They found that the transition from the action/gesture vocabulary and spoken language is mediated by word comprehension. Thus, to say that the infants were preverbal without any measure of their level of language production and comprehension is a methodological mistake.

In this regard, it is even more striking to note that Liszkowski et al. (2009) do not consider the fact that many experimental studies have been carried out specifically on the ability of very young infants to comprehend displaced speech (Gallerani et al., 2009; Ganea, 2005; Ganea & Saylor, 2012; Huttenlocher, 1974; Osina et al., 2012; Saylor, 2004). These studies suggest that 11- or 12-month-old infants can already understand displaced expressions in spoken language even if they only start to actively produce them at around 18 months of age (Sachs, 1983). At the beginning, this ability heavily relies on many factors such as contextual cues, the level of familiarity infants have with the absent entity, and especially, the temporal contiguity between the displaced speech and the last appearance of the absent entity (Ganea, 2005; Ganea & Saylor, 2012). In other words, at the very beginning, infants comprehend displaced speech more easily when it refers to entities that were physically or temporally contiguous. For example, if there is a long delay between the last appearance of an absent entity and the utterance of the displaced expression, then infants can fail in rehearsing the representation of the referent while they do not fail in no-delay conditions (Ganea & Saylor, 2012).



As Ganea and Saylor (2012, p. 1) pointed out, the ability to bring to mind an absent referent depends on different factors such as general representational abilities, contextual support, the strength of the relationship between a word and its referent, and the strength of the memory representation of the referent. In any case, these findings on the ability of 12-month-old infants to comprehend displaced speech are in themselves an argument against Liszkowski et al.'s (2009) study. In fact, this data suggests that, despite the presence of some constraints, even in the case of weak representational abilities, infants as young as 11 or 12 months can comprehend displaced speech in appropriate conditions. Again, the strength of this argument is independent of the definition of symbolic gesture that has been provided in the previous section.

For example, in Ganea (2005), we can find a more deflationist explanation of word comprehension in 12-month-old infants that relies much less on complex pragmatic abilities. This explanation, and all the experiments that support it, suggest that very young infants around their first birthday comprehend spoken displaced expressions. That is to say, language is already there and we are not justified in concluding that displaced gesture does not depend on language or, at least, we cannot rule out the possibility that linguistic competence, in a broad sense, has a role in the production of displaced gestures.

A second methodological remark concerns the fact that the authors do not report all of the needed information about the communicative context in which the infants produced their pointing gestures. It would be important, for example, to know whether the infants produced only gestures or gestures and vocalizations. Indeed, as Pizzuto and Capobianco (2005, p. 185) noted, young infants starting from 10 or 12 months of age are able to produce two-element utterances. In this very early stage, infants can produce bimodal equivalent utterances and supplementary or complementary utterances. Bimodal equivalent utterances combine two representational units, or a deictic gesture and a vocalization. In this latter case, the two elements convey the same information and they are often considered as one-element utterances. On the other hand, in the case of complementary or supplementary utterances, each element of the utterance contributes in a peculiar way to specify the meaning of the other element. Complementary utterances usually have a single referent which is addressed both by a deictic and a representational gesture. Each of these gestures contributes to the disambiguation of the referent. Supplementary utterances can address one or two referents and each element of the utterance adds specific information to the meaning of the utterance.

All of these types of two-element utterances are produced by 12-month-old infants. However, in the very early stages, from 12 to 16 months, bimodal equivalent utterances are by far the most frequent type produced. In this highly frequent behavior in early communication, both the gestural and the vocal modality combine to fulfill the function of the utterance. In particular, in this type of combination, a deictic gesture (e.g., pointing) can be accompanied by a vocalization, since both elements are involved in performing the same illocutionary function of that utterance. This early interrelationship between vocal and gestural modalities is not acknowledged by

Liszkowski and colleagues to the extent that the possibility of vocalizations accompanying gesture production is not even mentioned in their study. However, as it is elsewhere noted (Liszkowski et al., 2012), vocalizations accompanying gestures can provide additional cues to the interlocutor to use in understanding the infants' communicative exchange. Moreover, this early combination of modalities is significant for the further development of a multimodal language.

A third methodological remark concerns the procedure of the experiment. Before the trials, participants watched demonstrations where requests were carried out by means of specific or unspecific linguistic requests (e.g., "I want a ball" or "give me something" when a ball was present) and with the production of gestures (not pointing gestures, but facial or other manual gestures). The aim of the demonstration was to induce children to produce specific and referential requests. According to the authors, requests were carried out linguistically because a silent adult's interaction would have been unnatural. If the infants did not comprehend language at all, every sentence would have worked in the same way. Why did the authors use correct linguistic requests? This is another methodological mistake. Indeed, if infants understand the aim of the demonstration, we cannot rule out the possibility that they comprehend language. In other words, linguistic displaced expressions are an integral part of the warm-up trials and if children understand the demonstration, we cannot exclude the possibility that they already comprehend linguistic displacement. Accordingly, the authors of the study are not entitled to draw their conclusions.

#### **4. Gestures and Speech in Language Development**

Some interesting facts about the linguistic nature of abstract pointing gestures have been revealed by studies on language development. If we look at studies on the acquisition of language, we will see that the symbolic gesture is an early form of communication that even occur before first words (Acredolo & Goodwyn, 1985; Bates, 1976; Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Iverson, Capirci, & Caselli, 1994). Deictic gestures such as ritualized request, giving, showing, and pointing are produced early on. Infants start to produce deictic gestures directed towards objects present in the here-and-now context at about nine months of age (Bates, 1976; Bates et al., 1979; Lock, 1978; Volterra & Erting, 1994; Caselli et al., 2012). The first referential gestures can be produced both in isolation or in combination with other gestures (Bates, Camaioni, & Volterra, 1975; Bates et al., 1979; Volterra, Caselli, Capirci, & Pizzuto, 2003). Also, as many studies have pointed out, children start to use pointing gestures productively at about 12 months of age or even earlier (Antinoro Pizzuto & Capobianco, 2008; Capirci, Iverson, Pizzuto, & Volterra, 1996; Caselli et al., 2012; Lock, 1978; Pizzuto & Capobianco, 2005; Volterra & Erting, 1994).

These gestures precede the acquisition of vocal deixis in language development (Bates, 1976; Bates et al., 1979; Butcher & Goldin-Meadow, 2000; Caselli et al., 2012; Lock, 1978; Volterra & Erting, 1994). Representational gestures follow immediately

after (Acredolo & Goodwyn, 1985; Bates, 1976; Bates et al., 1979; Caselli et al., 2012; Iverson, Capirci, & Caselli, 1994), and the onset of gesture and speech integration occurs shortly after that, at about 14 months of age (Butcher & Goldin-Meadow, 2000). Thus, speech and gesture can already be considered a unified system in the one-word period of language acquisition. The integration between the two modalities will be fully mastered by the two-word period.

According to Butcher and Goldin-Meadow (2000), speech and gesture are integrated in a unified system when their relationship shows the defining features of adult usage: semantic coherence (combining gestures with meaningful and related speech) and temporal synchrony (producing a gesture in synchrony with speech). The integration between speech and gesture becomes progressively more complex, as infants progress from complementary to supplementary gesture-speech combinations (Butcher & Goldin-Meadow, 2000; Özçalışkan & Goldin-Meadow, 2009; Pizzuto & Capobianco, 2005). In light of these findings, 12-month-old infants in the Liszkowski et al.'s study can hardly be considered prelinguistic. Indeed, they are already producing abstract pointing gestures that are much more complex and cognitively more demanding than concrete pointing gestures. Thus, summarizing the data discussed so far, it is possible to say that “symbolic gestures tend to develop in tandem with the child’s early words” (Acredolo & Goodwyn, 1989, p. 450), and that they are often preceded by the acquisition of a high level of language comprehension.

The link between gesture production and later linguistic development has been analyzed by many researchers (Bates, 1976; Bates et al., 1979; Goldin-Meadow & Butcher, 2003; Iverson & Goldin-Meadow, 2005; Özçalışkan & Goldin-Meadow, 2005, 2009). Their findings have widely shown that gesture production predates and paves the way for speech development. This suggests that the gestures performed by 10–12 month-old infants are already carrying out linguistic functions because gesture and speech are a single integrated system (McNeill, 1992; Iverson & Goldin-Meadow, 2005, p. 370).

The interaction between speech and gesture is a topic that has been widely addressed. Different accounts have been proposed to explain the role of gesture (Hadar, Wenkert-Olenik, Krauss, & Soroker, 1998; Kendon, 1980, 2004; Kita & Ozyurek, 2003; Krauss & Hadar, 1999; McNeill, 1992, 2005). However, in each of these theories, gesture is functionally tied to speech. Language, then, starts with gestures and words, and as a lot of research suggests, it appears to be multimodal (e.g., Kendon, 2004; McNeill, 1992, 2000, 2005). Thus, gesture should be thought of as being part of language. Paradoxically, there seems to be a bias in the Liszkowski et al. (2009) study that consists in their identification of language mainly with speech because, following the authors’ argument, we can find conventional means in spoken expressions.

So, if gestures predict linguistic changes, anticipating linguistic functions that will later spread to the speech modality, the problem remains the identification of the beginning of language. When can we say that a child starts to learn language? Only when he or she says his or her first word? Only when he or she combines two words for the first time? Can symbolic gestures be considered the starting point of language

learning? Can language comprehension, before active production, be considered the starting point for the process of language acquisition? Depending on the answers given to these questions, gestures expressing displacement could be considered as being deeply involved in language, and infant displacement gestures could be considered as reliant on language, even if infants are not yet active speakers.

## **5. Gestures and the Acquisition of Negation in Home-Sign Languages**

In this section, we present a final argument concerning the production of displacement gesture and negation in home-sign systems. This section is a discussion of a piece of evidence presented by Liszkowski et al. (2009) in the last part of their article.

It is well known that negation is another distinctive and universal feature of human language (Horn, 2010). Every human language includes negation, but to date we do not know of any animal communication system that has negation (although some forms of rejection have been identified). Negation and displacement seem to be connected in some way. Indeed, often displacement is entailed by the expression of linguistic negation. The topic of the connection between negation and displacement will be addressed here in relation to home-sign systems. In fact, in the Liszkowski et al. (2009) study, the authors concluded their work by briefly presenting and discussing the displacement gestures produced by a deaf child of hearing parents. Although the child was not exposed to conventional language, he started to use displacement gestures. This was a proof, according to Liszkowski et al. (2009), that exposure to language is not necessary for displacement.

Two main objections can be made to Liszkowski and colleagues' argument. First, it should be noted that the child used displacement gestures in a home-sign system that he developed with his parents. This communication system is already symbolic and tied to the faculty of language. Second, there is evidence that even negation, a unique and distinctive characteristic of human language, can be expressed in home-sign systems. Negation cannot be expressed without language. As a consequence, home-sign systems that can express both displacement and negation are not proof of the fact that exposure to language is not necessary for displacement.

Concerning the first objection, following Goldin-Meadow (1993), a home-sign language could be considered, at least, as an intentional communication system realized by means of shared symbols. Gestures produced in home-sign systems have some of the defining features of language. In fact, they may be regarded as clues that trigger a process of communication by means of a mutual recognition of communicative intentions, relying on some kind of shared background knowledge between speakers. The bigger the community is that uses these gestures, the more standardized and conventional they will become. Hence, even in a very small community, such as a family, symbolic gestures are shared by the community and entail an arbitrary relationship in the sense that they are the product of forms of implicit agreement between the interlocutors.

Home-sign systems are spontaneously created by deaf children and their non-signing relatives to make everyday communication possible. This means that deaf children are not exposed to any conventional sign language because they are not part of a deaf community. However, although home-sign languages are not handed down from generation to generation, being created anew in each familiar context, they present many of the core features of natural languages in their morphology and syntax (Franklin, Giannakidou, & Goldin-Meadow, 2011). For this reason, home-sign languages have been presented by Chomskian linguists as evidence of an innate language module. Deaf children, despite the fact that they are not exposed to any natural sign language, create symbolic systems with many of the core properties of natural languages.

Interestingly, Franklin et al. (2011) suggest that home-sign languages are often the roots of conventional sign languages. This is well documented, for example, in the case of Nicaraguan Sign Language. However, even if we put aside the complex and widely disputed hypothesis of an innate module, home-sign languages still present many characteristic features of natural languages. Hence, if home-sign systems have many core properties of natural languages, despite the fact that they are not full languages, displacement gesture in home-sign languages cannot be convincingly presented as evidence that displacement does not depend on language. It would be impressive if the child mentioned by Liskowski et al. (2009) had used abstract pointing gestures outside of any intentional symbolic communication, but this seems not to be the case. Home-sign systems are already a form of symbolic communication and need to be shared by a larger community to become highly conventional languages.

In summary, according to Liskowski et al. (2009), home-sign systems can be considered as an argument in favor of the fact that displacement gestures do not rely on language because children using these systems are able to express displacement gestures even though they are not exposed to any conventional language. However, these communication systems display many undoubtedly linguistic properties and, since they show linguistic properties, it is not possible to say that exposure to language is not occurring.

The second objection to Liskowski and colleagues' argument is addressed in the rest of this section. In particular, we will focus on the expression of negation in home-sign systems. The aim of this section is to show that even home-sign systems express complex and specifically linguistic structures such as negation. The presence of peculiar linguistic structures in these communication systems can be regarded as proof of their linguistic nature.

Data from an American home-signer (Franklin et al., 2011) suggests that home-sign languages possess structure-building devices, even for negation and questions:

We argue that the home-sign system we studied possesses lexical items corresponding to negation and question, and that, in employing them, the system applies syntactic modifications of the kind just described. (Franklin et al., 2011, p. 399)

It is of paramount importance at this point, to show the linguistic nature of home-sign systems, to assess the intrinsic symbolic nature of negation. Psycholinguistic studies can help us to reach this goal. By looking at first-language learning in infancy, we can identify (see Dimroth, 2010 for a review) three steps in the acquisition of linguistic negation: 1) rejection/refusal; 2) disappearance/nonexistence/unfulfilled expectation; 3) denial.

According to many studies (Choi, 1988; Pea, 1980; Volterra & Antinucci, 1979), rejection is the first category of negation to be acquired. Children use 'no' to express refusal of something existing in their present context. However, we can find examples of rejection in human pre-linguistic gestures and even in animal behavior. In fact, before the time children start to produce the single word 'no' to express rejection, they have already expressed rejection non-linguistically. Rejection, according to Pea (1980), does not require a symbolic representation, while nonexistence and denial do require them. Indeed, rejection can be considered as the expression of an emotional mood towards an object or action present in that context. Children do not need to have a symbolic representation of that object or action in their minds. By rejecting the object or action, they are only expressing their feelings towards them.

The second category of linguistic negation to arise is disappearance/nonexistence/unfulfilled expectation. At this point, children are able to signal the absence or disappearance of an expected referent in the context of speech or to indicate something that violates their expectations, based on previous experience (for instance, malfunctioning toys). This kind of negation requires a symbolic representation. Indeed, in this case, the object or action or person that the linguistic negation is addressing is not present in the here-and-now context. Negation, hence, is not acting on something present in the context, but on a representation of something.

Lastly, the third category to be acquired is denial. To deny, children must have the ability to discern between their own knowledge of the world and the knowledge of their listener (Bloom, 1979). In order to deny a sentence, children have to manage two propositions, one affirming and one negating the same predication; and they have to ascribe one of them to the person they are speaking to. In the case of denial, the object, action, or person addressed by the negation is not physically present in the context. Mainly, negation addresses a belief attributed to the interlocutor that expresses a counterfactual state of affairs. Interestingly, according to Franklin et al. (2011), all of the three categories of negation (rejection, nonexistence, and even denial) were produced in the home-sign system of David, the deaf child of their study. He produced gestures (mostly side-to-side headshakes) that functioned like sentential negative markers that have a fixed position at the beginning of the sentences.

At this point we return to the Liszkowski et al. (2009) study to look more closely at what they say about displacement in a home-sign system:

Converging evidence comes from research on a deaf-born child of hearing parents. Without exposure to conventional language, this child developed a communication system that also included acts of displaced reference (Butcher, Mylander, & Goldin-Meadow, 1991). In human evolution, referential acts were presumably used initially for indicating perceptible objects and events, so going beyond this required further

representational skills and the ability to track relevant common ground in social interaction. The ontogenetic primacy of the ability to communicate about absent entities demonstrates that it is not dependent on, but rather foundational to, language. (Liszkowski et al., 2009, p. 659)

According to Liszkowski et al. (2009), displacement is not dependent on, but rather foundational to language, and the observation of displaced gestures in home-sign systems supports this hypothesis. However, data from the Franklin et al. (2011) study showed that home-sign systems have structure-building devices for negation and questions, and even for the more complex forms of negation. Then, with these premises, following Liszkowski et al.'s argument, it should be concluded that complex forms of negation and questions do not rely on language but instead are foundational to language. But this conclusion is too strong, and the argument of displacement gesture in home-sign systems should be rejected. Displacement gestures produced in home-sign systems are symbolic, according to the definition of symbolic gestures previously proposed, and the symbolic nature of home-sign systems relies on the faculty of language.

On the other hand, it is widely accepted in the psycholinguistic literature that 'no', expressing the function of nonexistence, is one of the first words children learn to say. It is reasonable to claim that the displacement gestures in the Liszkowski et al. study predate and predict the expression of nonexistence that is later expressed in conventional language. Indeed, by using a displacement gesture, infants are communicating something about an absent referent. Thus, the displacement gesture is the first symbolic expression that allows for the acknowledgment of nonexistence. Nonexistence could not be expressed without displacement. Then, displacement can be considered foundational to negation. Without displacement, negation would always be anchored to the here-and-now context. Thus, we may hypothesize that without displacement, only the first and simplest category of negation would have come out. Intentional displacement, on the other hand, depends on the faculty of language. And, indeed, no communication system other than human language has intentional displacement and complex forms of negation.

In a recent paper, Liszkowski et al. (2012) consider pointing gesture as a prelinguistic and language-independent basis for language. If this can be considered true in the case of concrete pointing, it does not hold true in the case of abstract pointing, which can only be understood by relying on the same processes as those involved in language comprehension. It does not matter if the first linguistic expression is a word or a gesture (i.e., an abstract pointing). In any case, we are already in the linguistic game. Displacement, according to this analysis, is grounded in our species-specific faculty of language, which can only be properly manifested in a cultural community. Thus, it is reasonable to conclude that the abstract pointing gesture in the Liszkowski et al. (2009) study is an instantiation of symbolic and linguistic communication.

## 6. Conclusion

In conclusion, the Liszkowski et al. study does not support the claim that displacement gestures do not depend on language. Displacement seems to be a symbolic operation tied to language, even in preverbal infant gestures. The expression of intentional displacement cannot be considered foundational to language because it already requires all of the processes involved in the interpretation of linguistic communication. In other words, when children intentionally express displacement, even in the gestural modality, they are already beyond the boundary of language.

Significantly, displacement gestures seem to be linked to linguistic negation and predate the expression of nonexistence. Moreover, and most importantly, the expression of displacement seems to be a necessary condition for the acquisition of the more complex forms of negation. Without displacement, negation could not go beyond the here-and-now context. Thus, displacement is foundational to the complex forms of negation, and the expression of displacement in gestural communication predates and predicts the expression of complex negative structures.

## Note

- [1] Although both authors discussed and designed the article together, sections 3, 4, and 5 were written by Valentina Cuccio, while section 2 was written by Marco Carapezza. Sections 1 and 6 were written jointly by both authors.

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