What sign language creation teaches us about language

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How do languages emerge? What are the necessary ingredients and circumstances that permit new languages to form? Various researchers within the disciplines of primatology, anthropology, psychology, and linguistics have offered different answers to this question depending on their perspective. Language acquisition, language evolution, primate communication, and the study of spoken varieties of pidgin and creoles address these issues, but in this article we describe a relatively new and important area that contributes to our understanding of language creation and emergence. Three types of communication systems that use the hands and body to communicate will be the focus of this article: gesture, homesign systems, and sign languages. The focus of this article is to explain why mapping the path from gesture to homesign to sign language has become an important research topic for understanding language emergence, not only for the field of sign languages, but also for language in general. © 2012 John Wiley & Sons, Ltd.

INTRODUCTION

Researchers in a variety of disciplines offer different, mostly partial, answers to the question, 'What are the stages of language creation?' Language creation can refer to any number of phylogenic and ontogenic sequences of events. Because all preceding species of humans have disappeared, some researchers have looked to great apes, our genetic relatives, for an explanation of language evolution. Tomasello and coworkers, for example, have argued that shared attention (two individuals paying attention to the same object or event) and intentionality (awareness of what your conversation partner knows and would like to know) form the basis from which language developed.[1,2] Language acquisition provides another important window on this question; in a certain sense every child creates a language anew as she/he matures and acquires the language of those around her/him. But in the case of the child, there is a

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linguistic community, a language model, and a 21st century mind/brain that well-equip the child for this task. When the very first languages were created the social and physiological conditions were very different. Spoken language pidgin varieties can also shed some light on the question of language creation. When groups using different languages are suddenly put together and must communicate out of necessity, new ways of communication are negotiated; however, these individuals all possess a native language before creating and using a pidgin; thus, there is no way to determine how much speakers' prior knowledge of a language helps or hinders the creation of a new one in the form of a pidgin variety.

It is also important to keep in mind that language creation can include many disparate contributing parts: symbol creation, rule creation, and complex communicative strategies. Here we are defining language as a complex grammar that minimally includes syntactic, morphological, phonological, and pragmatic components. The debates about language evolution concern periods in our history when the brain was changing physically in crucial ways that made language possible; this is not a part of the discussion here. Instead, this article will help to tease apart the contributions that the sustained use of a primary communication system, a linguistic

community, and a language model make during the creation of the components of a linguistic system. For consistency, the term language creation will be used to refer to developments within a single individual and language emergence when it refers to developments within a group.

DISTINCTIONS AMONG GESTURE, HOMESIGN, AND SIGN LANGUAGE

The types of gesture, homesign, and sign language involved in language emergence are described below. Particular attention will be paid to homesign and to different types of emerging sign language systems, as this is the focus of the current article.

Gesture

Gesture can be used to describe any communicative movements or postures, but in the current work this term refers specifically to those gestures produced by hearing people in the context of spoken language production. Referring to gesture in this way has become more widely known in recent decades.[3–7] Co-speech gestures are those produced simultaneously with speech; they can be representational or prosodic (and often both), and appear, on average, once per clause.[5,6,8] Gestural patterns vary according to culture and language family,[9] and the use of gesture is beneficial to the speaker and to the listener.[10] Gestures are tightly integrated with, and form a system with respect to, the accompanying speech, but do not stand alone as a system. Even emblematic gestures, those that can be articulated without voice and have stand-alone meanings, are produced in the context of spoken language; emblems do not form a primary communication system. Owing to its visual nature, emblems and co-speech gestures are accessible to all of the groups important in this piece—hearing gesturers, homesigners, and signers—because these individuals coexist in a culture, and conventional gestures as well as other gesture patterns are part of that culture as well. The gestures of hearing people can provide some of the raw materials used in creating a homesign system; however, they have been meticulously studied in order to determine whether mothers' gestures form the basis of the child homesigners' systems, and the conclusion is that they do not.[11]

A branch of gesture research investigates the gestures that hearing people invent to communicate without their voices, focusing on communicating solely in the manual modality.[12–15] These gestures provide clues to the gestural abilities that we all share given the opportunity to tap into them, by

allowing the communicative workload to be singularly directed toward the visual/gestural modality rather than divided between gesture and speech. For this reason, this distinction between 'co-speech' and 'no-speech' gesture is sometimes referred to as a cataclysmic break because the exclusive use of the manual modality facilitates properties that are also seen in 'no-speech' gesture, homesign systems, and sign languages, but not co-speech gesture.[12]

Homesign

Homesign is a basic communication system created within a family and involves one (or possibly a few) linguistically, but not socially isolated deaf individuals. In the absence of a linguistic community, *per se*, these deaf individuals use gestures to communicate with the people around them, devising a method for communicating through gestures that becomes systematic, and for the deaf individual it is their primary means of communication.[16] Goldin-Meadow et al.[16–19] and Coppola et al.[20,21] have investigated homesign systems extensively. Goldin-Meadow has investigated child homesigners in a number of countries (Turkey, Spain, Taiwan, the United States), while Coppola has studied adult homesigners and their families in Nicaragua. Child and adult homesigners lack access to the spoken language due to hearing loss that is not ameliorated by effective use of hearing aids or cochlear implants, and they also do not have access to a sign language. The child homesigners are being raised in hearing families and attend schools where, for a variety of reasons, sign language is not being used, and their child homesign systems have been analyzed before they become literate. In the case of the adult homesigners studied by Coppola, lack of education precludes them from acquiring the surrounding written language (they are not literate) and they do not have access to a sign language because there is no deaf signing community in the vicinity.

Characterizing homesign systems is a crucial step in studying human language creation because they constitute a primary means of communication for the deaf individuals who use them. 'No-speech' gestures of hearing people under experimental conditions resemble homesign in a few respects, such as having a consistent word order for basic sentences; the exclusive use of the manual modality facilitates properties that are sign-language-like. However, 'no-speech' gesture is not the primary communication system of the participants in these experiments. Some of these studies will be described in more detail in a later section of this piece. The difference concerns what can be created on the spot under experimental

conditions (gesture) versus what can be created over time by an individual using only that system (homesign).

Emerging Sign Languages

Emerging sign languages are those that are used as a primary communication system by a group of deaf people (i.e., homesigners) when they come together as a community for the first time. Senghas et al. note that two ingredients are necessary for a new language to emerge: a shared symbolic environment and the ability to exploit that environment as a child learner.[18] Consequently, they propose that language genesis requires two cohorts of a community in sequence, because neither children nor adults alone can provide both ingredients. Sign languages tend to develop in one of two ways. Both involve contact among deaf individuals who use homesign systems at first; the system that emerges because of initial contact is subsequently observed and used by younger members of the community as they enter it and have sustained contact with community members. One path results in a 'deaf community sign language' and the other path results in a 'village sign language'. Both are described in detail below. The notable differences between them are the number of individuals involved and the proportion of individuals who use the sign language as their primary language; both of these factors (general size of the community and number of deaf users) appear to influence the types and rapidity of grammatical development.[22,23] For the purposes of scholarship, groups of signers at these critical moments have been divided into the group present during the 'initial contact stage' (called 'cohort 1' or 'first generation') versus subsequent group(s) groups, called the 'sustained contact stage' ('cohort 2' or 'younger generation').

In the case of a 'deaf community sign language', an institution, such as a school for special education, serves as a magnet for homesigners and provides a forum for interaction. In such cases, a relatively large number of deaf people interact across a variety of ages in the context of a community. This has happened in the development of many sign languages, including Nicaraguan Sign Language (NSL).[18,22,23,19,24]

In 1978, the existing center for special education in Nicaragua's capital Managua was expanded, and a vocational center for adolescents was established, creating an opportunity for deaf people of different ages to communicate freely using gestures, and to interact continuously over time. During the initial contact stage these circumstances provide an opportunity to individual homesign systems to be shared and modified. Such conditions had not previously existed in Nicaragua, and led to the emergence of the country's first deaf community. This first cohort of signers ushered in the initial contact period that launched the emergence of NSL.[18,24] In a deaf community sign language, each deaf individual has the potential to engage a large number of signing interlocutors. New members continually are entering the community, and subsequently there are also a relatively large number of younger students who receive this initial signing as their language model. The variety of a sign language associated with the sustained contact period allows the cohort 2 variety to emerge, which has been further stabilized and modified with respect to the variety used by cohort 1. Studies have shown that these two varieties are not based on the number of years of contact but rather the differences in the language environments as just described.[24,25]

A second way that sign languages develop is in the context of a stable community in which there is a relatively high incidence of deafness; the incidence of deafness is considered 'high' if it is substantially higher than that which is found in the general population, often quoted to be 1 in 1000 live births or one-half of 1% (0.5%). Deaf individuals not only find and interact with each other regularly, but also use the sign language frequently with their hearing family members. These hearing individuals exhibit varying degrees of sign language proficiency as a result of the high incidence of deafness in the community overall. These are referred to as 'village sign languages'. This occurred on the island of Martha's Vineyard in the 17th century[26], in the case of Al-Sayyid Bedouin Sign Language (ABSL) in Israel[27–29], and in the village sign languages of Africa[30], India, Pakistan, and other countries.[31] For example, at its height, the proportion of deaf users of Martha's Vineyard Sign Language (relative to the total hearing population) was between 2 and 4%, and the proportion for ABSL is also approximately 4%.[32] In such communities, the initial contact stage may be protracted because the ratio of deaf to hearing members of the community is quite small, the number of deaf people is smaller overall, and the number of new child learners is limited to the actual number of deaf babies born. In addition, the high degree of shared context in the family social environment may exert less communicative pressure on an emerging language, potentially also slowing development of complex devices. These factors may influence the speed that sustained contact varieties of village sign languages are modified.

It is difficult to say which is the more 'typical' case—a deaf community sign language or a village sign language. In the deaf community sign language

case, the number of deaf people using the system as their primary language is greater than in the village sign language case, but transmission is not via families, as it is for spoken languages and in the village sign language situation. However, the deaf community sign language model has been replicated many times in the history of signing communities, so it is the more common way for sign languages to develop. In the case of village sign languages, sign languages emerge within preexisting, stable social groups, and transmission is more likely to occur within extended families, but the number of deaf individuals using the system as their primary mode of communication is very small. Even if hearing people learn and use the system, they may be less likely to produce language innovations because they do not use the system all the time.

While it might be tempting to call the initial contact varieties sign 'pidgins', it is more accurate to call them initial contact varieties because they differ in one very important respect from spoken pidgins. Examples of spoken pidgins include Tok Pisin from Papua New Guinea,[33] Nigerian Pidgin[34] (both predominantly based on an English vocabulary), and Chinook Jargon,[35] a contact variety based on several Native American languages from the Pacific Northwest. In contrast to the creators of the emerging languages discussed here, all users of spoken pidgins possess a native language; it is simply not very useful in the situation where they find themselves, and so pidgins are created to bridge the gap. The effect of the contributing languages can take two forms, which may have distinct effects: the effect of having *any* native language; and the effect of having a particular native language, whose structures may or may not be compatible with those of the languages contributing to the pidgin. The emerging sign languages that we are discussing here are based on individual homesign systems, not the first languages of the individuals who contribute to building the new language, thus reducing the influence of preexisting linguistic structures. In like manner, the term sustained contact varieties will be used instead of the term 'creole' because of their origin.

Mature sign languages have been shown to contain all aspects of grammar and to be as complex as spoken languages.[36–42] A system is a 'mature sign language' if it is used by a reasonably large linguistic community, has been demonstrated to have a complex grammar in phonology, syntax, and morphology, and is used for all aspects of life: worship, entertainment, education, distribution of information, and social cohesion. Even the most well-established sign languages are still rather young when placed alongside their spoken language counterparts, some of which have existed for millennia. This is an advantage in studying their emergence, because both younger and older sign languages are not so very far removed from their origins. Most mature sign languages date back to the 1700s—American Sign Language (ASL), Swedish Sign Language, Italian Sign Language, French Sign Language, and Greek Sign Language—to name a few.[43] A few sign languages are chronologically young, yet 'mature'; Israeli Sign Language (ISL), a deaf community sign language, is such a case. It is approximately 75 years old, the same age as the emerging ABSL, yet at least in the current generation of signers it exhibits all the characteristics of a mature sign language with respect to the social and grammatical criteria mentioned above.[22,29,32] The comparison between ISL and ABSL hints that change may occur somewhat more slowly in village sign languages than in deaf community sign languages.[22,27–29]

SIGN LANGUAGE CREATION AS A WINDOW ON LANGUAGE CREATION AND EMERGENCE

In this section, a few key structural differences that distinguish among the systems that are important for the emergence of sign languages will be described.

'No-Speech' Gesture versus Homesign

One phenomenon that has been found in both mature sign languages and adult homesigners (but not in gesture) is a part of phonological structure. This has been called 'proto-phonology'.[14] The distribution of *finger groups* in sign languages creates both phonological and morphological contrasts, and they can be grouped into low, medium, and high complexity forms based on frequency. Finger groups that use the whole hand or only the index finger are the most frequent and hence the least complex finger groups; other finger groups are more complex. Some examples are given in Figure 1.

Adult signers of American and Italian Sign Language have been shown to use higher complexity finger groups in handshapes representing properties of the object and lower complexity finger groups in handshapes representing how objects are handled. Three of four adult homesigners patterned like the signers, but the gesturers (without voice) show a different pattern with a tendency to use higher complexity finger groups in handshapes that represent how objects are handled (examples shown in Figure 2).

Moreover, within both the gesture and signing groups, children at 4 years of age show the same pattern as adults, but a longitudinal study of one
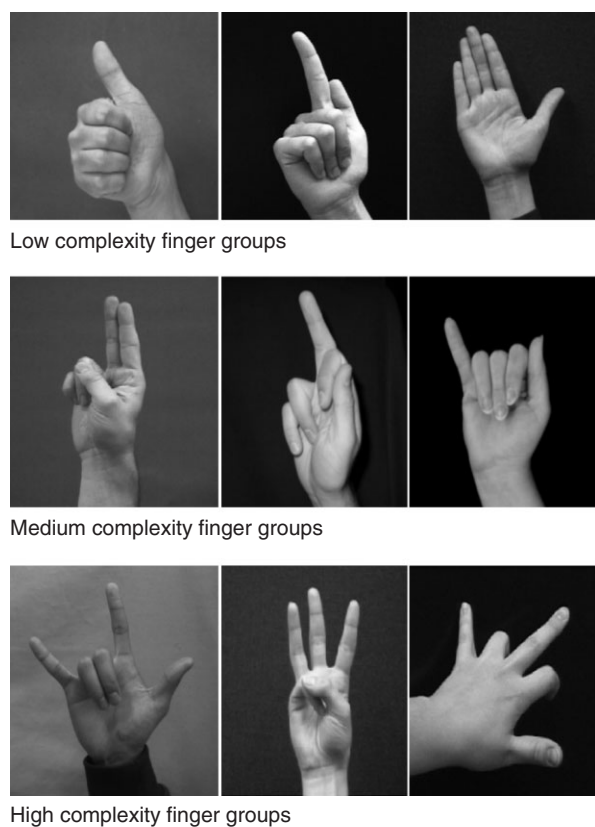
FIGURE 1 | Finger groups of low complexity, medium complexity, and high complexity—top, middle, bottom. Adult signers and homesigners used higher complexity finger groups in handshapes representing properties of the object and lower complexity finger groups in handshapes representing how objects are handled. Gesturers used the opposite pattern—i.e., higher complexity finger groups in handshapes representing how objects are handled and lower complexity finger groups in handshapes representing properties of the object.
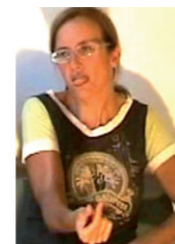

FIGURE 2 | Signers of Italian Sign Language produced higher complexity handshapes in object representations than in handling representations. Adult homesigners in Nicaragua patterned like the Italian signers. In contrast, hearing Italian gesturers showed the opposite pattern[14] Reprinted with permission from Springer Publishing.

homesigning Nicaraguan child shows that he possesses the gesturers' pattern at age 7 and the signers' pattern at age 11[44] (Figure 3). This result suggests that: (1) the homesign system is capable of changing throughout the lifespan, even if it happens at a slower rate, and (2) some patterns that appear quite early in acquisition may require more time to emerge in a homesign system.

It has also been demonstrated that the co-speech gestures produced by a homesigner's hearing family members also differ quantitatively and qualitatively from the systems used by homesigners. In separating nouns from verbs, one American homesigning child uses abbreviated movements in nouns compared to verbs (e.g., the gesture for 'food' would have an abbreviated movement toward the mouth when compared with the gesture for 'eat'), while his mother's gestures do not show this type of alternation. Thus, productive use of form-meaning correspondence

and a distinction between nouns and verbs based on form is present, a type of 'proto-morphology.[17] Gesture order (i.e., word order), a key element in the development of syntax, also showed systematicity in the homesigners that differs from that of their caregivers.[23] Homesigning children in Taiwan and the United States have the same gesture order—an ergative syntactic pattern, in which patients and intransitive actors tend to occur before the action gesture (e.g., *jar twist you*). However, the co-speech gestures of the children's mothers in neither country consistently followed the children's gesture order.[45,46] When a gesture order could be determined for the mothers, the transitive actor tended to appear before the action gesture (e.g., *you twist jar*).
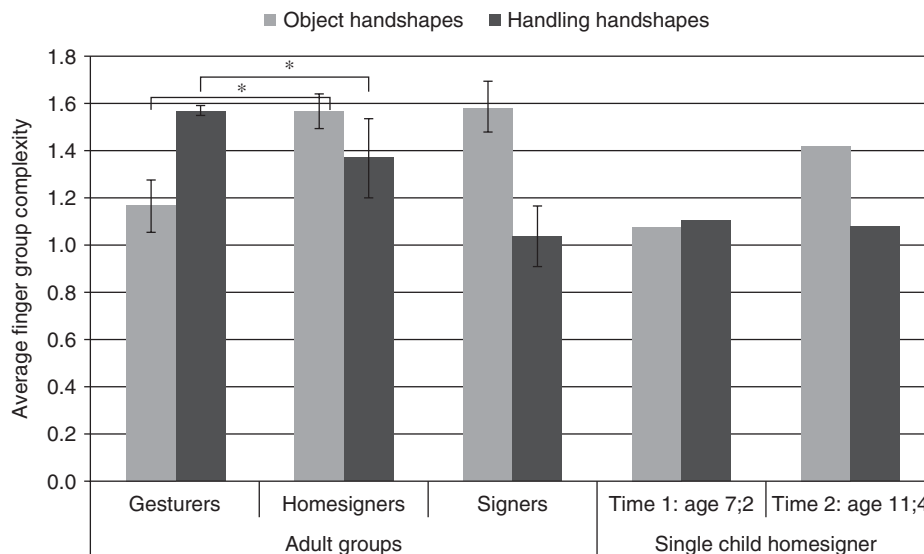
FIGURE 3 | Left: Average finger group complexity for adult Italian and American hearing gesturers (*N* = 6), adult homesigners in Nicaragua (*N* = 4), and adult Italian and American deaf native signers (*N* = 6). Right: The average finger group complexity for a homesigning child in Nicaragua at two points in his development. Note that the child's pattern at 'time 1' resembles that of the adult Gesture group, while that at 'time 2' resembles the pattern of the adult homesigners and signers.

Homesigners use their system as their primary means of communication; hearing gesturers do not and thus these differences are often attributed to this factor.

Homesign versus the Initial Contact Stage

One difference between homesign and the initial contact stage is associated with a differentiation in the use of pointing gestures. The quantity of pointing gestures overall does not change between the homesigner group and cohort 1 group of NSL signers; however, the integration of points into the grammar does change. For example, cohort 1 signers more often combine points that function as nominals (i.e., pronouns) with predicates (e.g., *point(he) + chase*) than do the homesigners. Further changes occur in subsequent NSL cohorts, and more details about the use of pointing gestures will be discussed in a subsequent section.

Ongoing work on narrative structure has shown another difference between adult homesigners and NSL signers from cohort 1, the initial stage of contact. In narratives, homesigners often fail to identify a character when mentioning the character for the first time (34% of the time), while signers of cohort 1 (and subsequent cohorts) always mark the introduction of a character in some way [e.g., [ø]*chase* (homesigner) vs *cat chase*] (cohort 1 signer).[47]

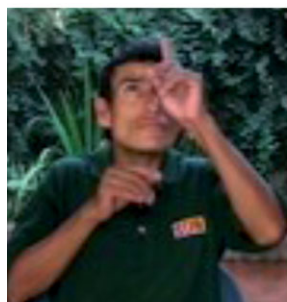At the initial stage of contact deaf community sign languages have a community of people using them as a primary communication system, but there is no language model; hence the differences enumerated above may be attributed to the presence of a linguistic community.

Initial Contact versus Sustained Contact Stages

After initial contact when a linguistic community is formed, subsequent cohorts or generations develop within a context that contains both a linguistic community and a language model. Below we describe a few phenomena that occur at the crucial transition between cohorts 1 and 2 of NSL or between older- and younger-generation varieties of ABSL.

Senghas et al. have described the difference in the forms used by NSL signers in cohorts 1 and 2 in expressing the manner and path of a motion event in a manual form.[48] Cohort 1 signers (and hearing gesturers) tend to express both path and manner simultaneously in a single movement, which is closer to what the event actually looks like, while cohort 2 signers segment the description of the motion event into a manner portion and a path portion in a linear fashion. These authors argue that the linearization in cohort 2 is similar to the heavy reliance on word order and serial verb constructions commonly seen in spoken language creoles. ASL, a mature sign language, regularly breaks up manner and path linearly as well, despite the fact that path and manner occur simultaneously in the events being described.[49]
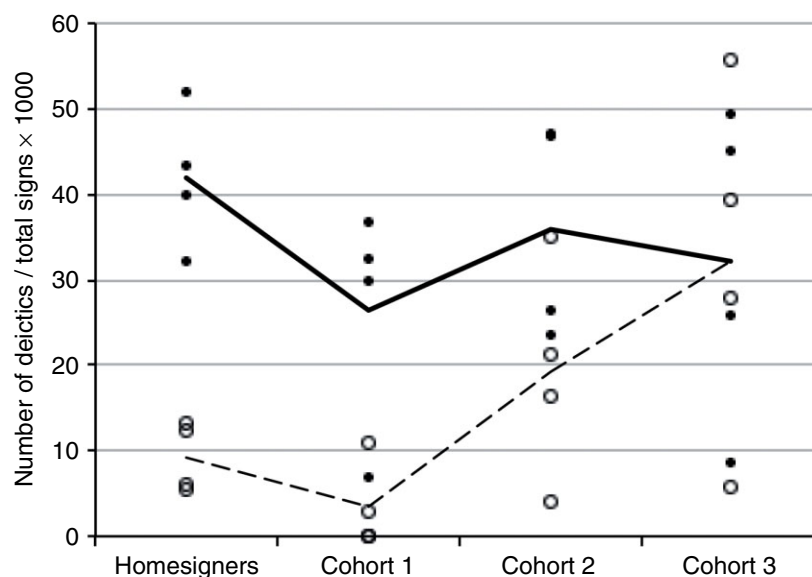
FIGURE 4 | Deictics (points to empty space) with locative uses (each filled circle represents a participant, solid line indicates mean) and nominal uses (each open circle represents a participant, dashed line indicates mean).[56] In contrast to locative deictics, which do not differ systematically across groups, nominal deictics exhibit a linear increase across the language continuum, suggesting the emergence of a new function for these forms. In locative, but not nominal points, eyegaze tends to follow the point; also, the movement of nominal points tends to be more constrained within the signing space, in accord with their less 'spatial' meaning. Reprinted with permission from Cambridge University Press.

Many mature sign languages use loci in space, and movement of verbs among those loci, to indicate shared reference in the grammar. These are sometimes collectively referred to as 'spatial modulations', and express the placement of arguments in the signing space and their continued use in verb agreement, objects possessed by the argument, and locations or trajectory of movement associated with the argument in spatial descriptions. For example, a signer might sign PAY to her right side, and then subsequently sign GIVE on the right side as well. This reuse of the space on the right side indicates that the same person was both paid and given to. Senghas and Coppola demonstrated that in NSL, cohorts 1 and 2 differed in their use of space to express shared

or co-reference.[25] Overall, cohort 2 signers who were exposed to the sign language before the age of 10 years produced significantly more spatial modulations than their early-exposed cohort 1 counterparts. Moreover, the use of shared reference was significantly higher in cohort 2, indicating that they are using space to organize their discourse.

Another case of differentiation between initial and sustained contact sign language varieties is syntactic/prosodic use of facial expression. Sandler et al. have argued that, despite the fact that both older- and younger-generation signers of ABSL use facial expression abundantly, the way they use it differs.[50] Facial expression in well-established sign languages has both affective and grammatical uses,[51]

and the timing of facial cues and their domains mark constituents, particularly the intonational phrase, which is often associated with the syntactic domain of the clause, although not isomorphic with it.[8,52–54] The combined frequency of affective and grammatical facial expression is roughly the same across both generations. But the generations differ in a striking way. Younger-generation signers more frequently produce facial expressions that can be analyzed as grammatical (rather than affective). Younger-generation signers also time their facial expressions with intonational phrase boundaries, and they use prosodic cues to create dependencies between clauses (e.g., If 'x', then 'y'). Older generation signers use prosodic cues, but they are not well-timed with constituent boundaries, nor do they signal such clausal dependencies.[50]

BOX 1

THE FOUR CRUCIAL EVENTS IN SIGN LANGUAGE EMERGENCE CAN BE SUMMARIZED AS FOLLOWS

(1) *Make it solely visual*: Using the manual modality to communicate without voice facilitates language-like qualities found in homesign and sign languages, such as gesture order. (2) *Use it as a primary communication system*: Home-signers use their system as their primary communication, unlike hearing people when they gesture, even when they gesture without using their voices. In homesign, certain innovations reflect the beginning of a linguistic system, such as a pattern of finger group complexity like that of signers, and noun–verb distinctions. (3) *Form a linguistic community*: 'Initial contact' varieties of an emerging sign language exhibit greater narrative cohesion and show better integration of pronouns into their grammars than do homesigners. (4) *Pass it on to the younger generation*: Grammatical devices become further differentiated in 'sustained contact' varieties of an emerging sign language. Compared with initial contact varieties, these varieties include more spatial modulations indicating shared reference and more grammatical use of prosody.

POINTING GESTURES TRACE THE ARC OF LANGUAGE

One effective way to see how communication becomes language is to trace a single phenomenon as far back in history as possible and in as many populations as possible. Unfortunately there is no direct continuity among the wide range of studies that has been conducted, no team of researchers who has used similar methods in all of the relevant groups, especially if we include not only the groups described above, but also great apes, and children acquiring signed or spoken language as a first language. A single experimental protocol cannot be used because of the diversity of the systems and populations involved. However, the pointing gesture has been investigated in all of these groups to some extent. As a way of understanding how a single form can be used in radically different ways, we will discuss results from great apes, children (gesturing, signing, and homesigning), and adults (gesturing, signing, and homesigning).

Tomasello devotes a great deal of attention to the use of points in great ape communication (phylogenetic) and compares these with infant pointing gestures (ontogenetic).[1,2] He reports a wide range of uses of points by hearing infants (11–14 months)—e.g., to request, to inform, to comment/observe, to share emotions, and to refer to both present and non-present referents. Deaf homesigning children display the same range of uses of points as do typically developing children who receive linguistic input.[16] In contrast, great apes in the wild use points almost exclusively to make requests. Tomasello acknowledges that great apes can learn to use gestures (including points) for a broader range of functions, but only after a great deal of training by humans. We proceed to describe in more detail the different functional and formal uses of points in the groups central to this article.

The functions of points in child homesigners and signers have been studied. Locative points are ubiquitous in the gestures produced by hearing people; nominal points are pervasive in established sign languages, and often function as pronouns.[55] Homesigners, without the benefit of a language model or a community, effortlessly use points for all language functions that infants learning language do. At this point let us assume, then, that pointing gestures in humans assume all of the functions of a natural language, but that these functions do not necessarily have systematically different forms. Differences in the form of pointing gestures have not been thoroughly described across groups, except in adult Nicaraguan homesigners and signers by Coppola and Senghas,[56] but this analysis is very useful in this context, because it shows how the functions and forms of points become more sophisticated in these populations. Nicaraguan adult homesigners, and signers from cohorts 1, 2, and 3 of NSL signers narrated the same cartoon

(Tweety and Sylvester's 'Canary Row'), and all points to empty space (rather than to real objects or locations) were analyzed. Each point was classified according to whether it expressed a location ('locative' points) or a character ('nominal' points). In the Nicaraguan groups several patterns are of interest, specifically with regard to nominal points. It is also worth noting that such nominal points have not been attested in all of the world's sign languages.[57]

Locative and nominal points differed in their form: signers' eye gaze tended to follow the direction of locative, but not nominal points, and nominal points tended to be articulated quickly, in the area directly in front of a signer's torso, with little or no movement, in contrast to the larger and slower movements associated with locative points (Figure 4). In addition, all Nicaraguan groups produced locative points with the same frequency, but not so with nominal points. Thus we see that only one type (nominal points) may undergo grammatical transformation, while another may not (locative points). Moreover, there was a steady increase in the frequency of nominal points across NSL signing cohorts, but homesigners and cohort 1 signers produced nominal points in neutral space—i.e., in a spatial location in front of the signer's torso—at roughly the same frequency. However, in an earlier section of this article it was noted that, even though these two groups used nominal points with roughly the same frequency, one of the structures that separated homesigners from cohort 1 signers was the use of combinations of nominal points with other signs.

Signers in all groups also pointed to their own chests, a form also produced by hearing people. However, this gesture has taken on a new function in NSL, to mark agents of events. Points to the chest increased steadily across the groups, and by cohort 3 they were exclusively produced clause initially and then followed by a verb. The authors consider this to be the nominalization of the form, because it is constrained to an initial position in the clause, as a type of subject. Thus, these points to the chest and the previously described nominal points pattern in the same way, and differ from points referring to the location of objects (locative points) in form, sign order, as well as in their distribution.

A close analysis of pointing gestures demonstrates that humans use them for a wider variety of functions than do apes. Within this wider set of functions shared by gesturers, homesigners, and signers, the form and function of the apparently simple pointing gesture become more differentiated by homesigners and emerging sign language cohorts. The increasing level of sophistication and grammaticalization of points thus illustrates the effects that the following factors exert on nascent language systems, which we have argued to be critical for the emergence of language: using a manual system as a primary means of communication, interaction in a linguistic community, and the availability of a language model.

CONCLUSION

Examining the creation of language from the vantage point of sign languages allows us to trace a path from systems of human communication in a way that is not possible through the lens of spoken languages. Homesign and emerging sign language varieties are the most crucial links in this chain of events: These are the moments when we see most clearly a system morph from being 'not language' to 'language'. In the case of homesign it is the initial stage of moving from a communication system (one integrated with speech or used occasionally without speech in experimental conditions) to a primary communication system. Various hints of phonology, morphology, and syntax are present in homesign systems. In the case of the initial contact stage, the added presence of a linguistic community allows us to see further early developments of linguistic structure without the complicating factor of speakers possessing a prior native language (as in spoken language pidgins). The integration of new deictic devices (pronouns) into the syntax and the development of narrative cohesive devices are two examples of such grammatical developments. And, users of a sign variety during the sustained contact stage show development in additional components of the grammar, such as in the use of prosody. Although homesigners and users of emerging sign languages have 21st century brains, by analyzing the individual systems at these different stages we gain an important and unique perspective on language as it is developed in historical time.

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