10

Language emergence

Al-Sayyid Bedouin Sign Language

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10.1 The forbidden experiment

Language and culture separate humans from all other species. No human group lacks either, which must mean that both are deeply seated in human nature. What are the essential ingredients of these two most human of attributes? Our central task as linguists is to try to answer this question for language.

One strategy for tackling this problem is to trace all existing human languages back to some original and so discover the fundamental properties of language. Nineteenth-century historical linguists tried to do this, with notable success, beginning from William Jones' observation that Sanskrit was so similar to Greek, Latin, Gothic, Celtic, and Persian that they must have descended from a common ancestor. Though remarkably reliable, the methods of historical linguistics are incapable of taking us back more than a few thousand years. In the nineteenth century, when most educated people believed that the world had begun no more than six thousand years before, these limitations presented no barrier to answering the question of the origin of language and historical linguistics flourished. But Charles Lyell, the founder of geology, destroyed all such hope when he argued successfully that the earth must be much older. We now know that the earth is billions of years old, that the human lineage split from the other great apes approximately six million years ago, and that anatomically modern humans have inhabited the earth for at least one hundred thousand years, emerging from Africa to spread across the globe at least fifty thousand years ago (see Dediu, this volume, Chapter 28). All of which means that we will never learn, using conventional historical linguistic methods, what the first human language was like.

Another tactic that linguists have advocated is to compare many modern languages. If we can discover what they all share, sometimes called *language universals*, then this may tell us what the basic structure of human languages is like. But detailed comparison of many languages has revealed

that they are much more diverse, at least on the surface, than researchers had hoped. This has led some researchers (Evans and Levinson, 2009: 168–9) to conclude that while many languages have properties similar to other languages, there are no universal properties that all languages share. Others (Hauser *et al.*, 2002) have looked for more abstract unifying principles, but in doing so they have had to jettison most of the properties that others deem central to human language (see Pinker and Jackendoff, 2005 for a description of these properties).

Both methods betray a fundamental problem that faces anyone dealing with the central question of language. Humans naturally acquire the language or languages that they are exposed to in early childhood, seemingly without effort, but these languages are different from one another and are all the product of historical change over many millennia, much of it resulting from chance. We can get at whatever is basic to human language by somehow controlling for this great diversity and historical contingency. One way to do this, termed *the forbidden experiment* by Shattuck (1980), has never been attempted scientifically because it is clearly unethical. It is to isolate a growing child from exposure to *any* existing language. Whatever language emerges under such circumstances will be untainted. There have been a number of recorded cases of children who have been deprived of human contact from infancy, but they present another problem besides the ethical one: humans are social creatures and when they are deprived of contact with others, especially in their very early years, they do not develop normally.

But what if humans were isolated from a linguistically organized model in some way that did not isolate them socially? What sort of language would they develop then? Susan Goldin-Meadow realized that deaf children born into hearing households in which exposure to sign language is prohibited presented just such a case (Goldin-Meadow and Feldman, 1977). They could not acquire the language that surrounded them and so had to create a system on their own. Goldin-Meadow (2003) has continued to provide insight from this sort of data successfully ever since.

But, as Goldin-Meadow would be the first to admit, this circumstance lacks one ingredient that characterizes all normal language communities: the opportunity for organized linguistic feedback. No matter how well intentioned the parents of a deaf child may be, the child is the only deaf person involved in the interaction. What would happen in a hearing family with more than one deaf child? Would the feedback that these children give one another exclusively in the visual medium lead to a communication system that is more like a language? And what if the parents were actively trying to interact with the deaf children in their own medium? Might this lead to a more structured system? What has been found may be even more interesting than such a scenario, and has been the subject of our own research for the past decade: a large extended family of deaf people that began with four deaf siblings.

10.2 The social conditions under which sign languages arise

Sign languages exist throughout the world, on almost every continent. Spoken languages are by far the most common human language type, but that sign languages exist at all is testament to the fact that human language can develop from very different resources – not speech primarily but elevating the hands, the body, and the face to become major articulators. Natural sign languages are social creations that emerge in communities with an acute need to communicate. Because the community has deaf members, either because of illness or genetic inheritance, the community reverts to using rich movement of hands on or around the body, accompanied by movements of the face and body, to create meaningful communication. While hearing people use such gestures as well, deaf people avail themselves solely of visually perceived signals, and, over time, these innovations become regularized and grammaticized as sign language.

Some sign languages have a relatively long history, with written records dating to as early as the sixteenth century in Spain (Plann, 1997). Many sign languages in Europe and North America developed from the establishment of schools for deaf children through the eighteenth and nineteenth centuries. We call these "deaf community" sign languages (Meir, Sandler *et al.*, 2010; Meir, Israel *et al.*, 2012) because they were formed out of interaction among a community of (mostly) deaf signers, over multiple generations.

Sign languages continue to emerge. New ones have appeared within the last few generations. These very young languages are reported from different parts of the world, for example, from Bali (Marsaja, 2008), Nicaragua (Senghas and Coppola, 2001), Ghana (Nyst, 2003), and Algeria (Lanesman and Meir, 2012), implying that language creation of this type has likely occurred many times through history. Because some of these languages emerged very recently, it is possible to watch a language grow from its roots in gesture and other forms of visible communication to its current linguistic form. Some of these new sign languages, such as Nicaraguan Sign Language, are deaf community sign languages, developing from cohorts of students attending a school for deaf children. Other new sign languages are "village sign languages," where signers share kinship and a geographic area. Most often the basis of deafness in a village sign language is genetic, and this has a number of consequences that figure in language emergence.[1]

10.3 Al-Sayyid Bedouin Sign Language

Village sign languages can emerge first in a single nuclear family. In the case of Al-Sayyid Bedouin Sign Language (ABSL), four deaf siblings were born into a family of hearing parents and other hearing siblings in the

1930s. In the next generation, deaf children were born into other families. After about seventy-five years, there are approximately 130 deaf members in a village of about 4,000 people (Kisch 2012). ABSL has persisted across four generations, changing as more people use the language.[2] What is notable about many village sign languages is the large numbers of hearing people who use these languages. From studying these sign languages we learn not only how deaf people in the community can communicate with others, but how hearing people, too, contribute in large part to the creation and persistence of a sign language across multiple generations. ABSL is now entering its fourth generation of signers.

In the case of village sign languages, genetics and social conditions are deeply interconnected. In Al-Sayyid, the shared genetic condition is recessive and non-syndromic. This means that deaf people can be born into a family with two hearing parents (if both are carriers), and hearing siblings. Further, most deaf people have no other genetic conditions accompanying their deafness, and no social prohibition against their integration, so they may participate fully in the social and work life of the community. In Al-Sayyid, as in many communities throughout the Middle East, marriage between close relatives is favored. While deafness is noted as an impairment, it is not stigmatized, so deaf people in Al-Sayyid may marry. The combined result of a recessive condition and intermarriage is close kinship ties between deaf and hearing people, who feel the need to communicate in sign language as acutely as do deaf people.

Over the period of seventy-five years since the first four deaf siblings were born in Al-Sayyid and ABSL with them, more households have acquired deaf members. We find a shared sign vocabulary within a household with several siblings and other first-order relatives. We call the language within a household a *familylect*. Across households, there may be two or more different signs for common names and objects, such as CAT, DOG, TOMATO, and EGG. Despite the existence of variation across families, signers still understand each other's signs, and tolerate differences in lexical choice. Nonetheless, all signers share a great deal of vocabulary (Meir, Sandler *et al.*, 2012) and grammatical structure, summarized here. The emergence of linguistic structure can be seen within the household, and across households in the community.

We have often been asked whether the spoken language of the hearing people influences the sign language under these circumstances, an idea we would like to address at this point. In the case of ABSL, we have not found such influence. For example, the SOV word order of ABSL does not follow the SVO order of the local language (Sandler *et al.*, 2005). While the local Arabic is a richly inflected language, no inflection has been found in ABSL (Padden *et al.*, 2010a). The hearing interlocutors seem to have an intuitive understanding that the medium is different, and regard Arabic and ABSL as two different linguistic systems. Of course, cultural influence is found in meanings reflected in some signs, for example, in early names for days of

the week such as 'market day' and 'prayer day' (Meir *et al.*, 2012). However, no influence of Arabic grammatical structure has been found, and there is no evidence of creolization between the signed and spoken languages. Instead, the study of new sign languages such as ABSL offers a real-life view of how a language emerges anew, how it conventionalizes and spreads across users in a community.

10.3.1 Syntax

A fundamental property of human language is the existence of syntax, the level of organization that contains conventions for combining symbolic units, the words. Syntax provides the means for encoding the semantic content of propositions. Some of the resources available for this purpose are the relations among words and phrases, elements that mark dependency relations such as inflectional morphemes and function words, and elements that mark cross-reference such as pronouns. Which of all these elements are available for a new language, and how can a language develop them over time?

We learn from grammaticization research that function words can develop from content words. A word meaning 'head' or 'top' may evolve into a preposition meaning 'on top of', and eventually 'on'. Such processes are attested in all languages and are very common (Heine and Kuteva, 2002b). They may even be found in very early stages of a language.[3] Sign languages are no exception. In ABSL we find that the verb RUN is also used as an adverb QUICKLY, and in Israeli Sign Language (ISL) the verb BEAT/WIN has acquired the meaning 'more than'.

Inflectional morphemes often develop from function words, and constitute a final stage of the grammaticization process. A preposition such as "on" may eventually develop into a case marker (Heine and Kuteva, 2002a). Yet the process of developing first function words and then inflectional morphemes takes a long time. The Romance future inflection, for example, took several centuries to evolve. We cannot expect such machinery to accrue early in the development of a language. This leads to another question: How can a language express the semantic content of a proposition without linguistic items designated to mark these relations?

One major problem in conveying propositional content is marking "who did what to whom." Sometimes such information may be inferred from the semantics of the verb, properties of the arguments, contextual clues, and general knowledge. Yet semantic and contextual clues may lead to a dead end. While the string of words *boy tree hug* can have only one plausible interpretation in our world, the string *boy girl hug* may have two plausible interpretations, which can be systematically distinguished only if a communication system develops formal means for marking the hugger and the huggee. Once this is introduced into the system, the system becomes independent of the pragmatic context, and can expand its expressive

capabilities to describe events that cannot happen in our world, such as *The tree hugged/talked to the boy*.

How, then, does such a mechanism emerge in a new language? Does it show up full-blown right from the beginning, or does it take time to develop? Is there one universal course of development?

Our findings suggest some answers to these questions. We find that users of a new language initially avoid marking argument structure grammatically and instead use a variety of strategies that eliminate the need for overt marking. One is to use single-argument clauses. If a clause has only one argument, then its relationship to the verb can be inferred from the semantics of the verb and there is no possible ambiguity about which argument bears which role. If a language is restricted to one-argument clauses, there is no need to develop argument structure marking.

We find this single argument structure commonly in older signers of ABSL, and of Israeli Sign Language (ISL) as well.[4] When describing transitive events with two human participants, these older signers often break the event into two clauses, with two verb signs, each predicating of a different participant. Thus, an event in which a girl feeds a woman may be described as: WOMAN SIT; GIRL FEED. An event in which a man throws a ball to a girl can be rendered as: GIRL STAND; MAN BALL THROW; GIRL CATCH. In ISL, 33 percent of the descriptions of such events used this strategy, and in ABSL the proportion was even higher – 47 percent of the responses (Meir, 2010; Padden *et al.*, 2010a).

The same tendency towards one-argument clauses has been reported for another new sign language, Nicaraguan Sign Language, which emerged about thirty years ago, when the first school for the deaf was founded in Managua. The first group of deaf children brought to the school came from hearing families, and were not exposed to signing deaf adults. However, as they began to communicate with each other, a signing system started to emerge. The use of this system by subsequent cohorts of children who acquired it from their older peers brought changes into the language. Ann Senghas and her colleagues, who have been studying the language since its inception, report that the first cohort showed a strong tendency towards one-argument clauses if both arguments participating in an event were human. In fact, in their data they did not find *any* response consisting of two human nouns and a verb (Senghas *et al.*, 1997: 554). Typical responses were: MAN PUSH WOMAN FALL, MAN PUSH WOMAN GET-PUSHED when describing a clip showing a man pushing a woman, and MAN CUP GIVE WOMAN RECEIVE for an event in which a man is giving a cup to a woman. In the second cohort different word orders appeared, some of which had the two verbs adjacent to each other (e.g., MAN WOMAN PUSH FALL, or MAN PUSH FALL WOMAN). However, even in the second cohort no responses consisted of two human nouns and one verb.

Three young languages, then, show a very strong preference for one-argument clauses in their initial stages.[5] The strategy of producing two

clauses for an event such as pushing, although efficient in terms of associating arguments with syntactic roles and avoiding ambiguities, is cumbersome. First, the number of verbs in the discourse is multiplied, since every animate argument is associated with a different verb. Secondly, it is not always clear which verbs can be used to predicate each of the different arguments of an event. For example, in case of a seeing event, as in *The child saw the man*, what verb can be associated with the object? The only verb that comes to mind is 'be seen', so that the event is rendered as *The child sees, the man is seen*. This, again, creates a very "heavy" and, in a way, redundant discourse.

We expect a communication system that functions as a language to eventually develop a consistent device for marking argument roles. Of the three mechanisms for marking participants' roles mentioned above – word order, case marking, and verb agreement – the last two are morphological. Inflectional morphology takes time to develop, because it calls for the arbitrary association of a phonological string with a grammatical function, often through the very gradual grammaticization of a lexical element (Heine and Kuteva, 2002a). The literature on creole languages provides numerous examples of the phenomenon (Bruyn, 2008). McWhorter (1998) claims that the youngest creoles show no inflectional morphology, which only develops with time. However, word order, the relative order of the different constituents of a clause, requires no grammaticization of lexical material. It can therefore be expected to appear earlier in the development of a language. And indeed, we find that some new sign languages make use of this possibility.

Several village sign languages have developed a predominant word order. ABSL developed SOV order by its second generation. In our study of nine second-generation signers of ABSL, a consistent SOV order emerged (Sandler *et al*., 2005; Padden *et al*., 2010b). Though one-argument clauses by far outnumber multi-argument clauses (99 clauses out of 150), out of those 51 clauses containing two or more arguments, 31 (61%) were SOV, 8 (16%) were SVO, and 5 (10%) were OSV.[6]

Information about other sign languages emerging in small village communities suggests that in some of them a consistent word order had not developed by the time the studies were conducted. Kata Kolok, a village sign language of Bali, adheres to SVO order when possible ambiguities may arise (e.g., when both participants in an action can be either the subject or the object, as in *X sees Y*), but uses more flexible word order when the sentence can be disambiguated by its semantics alone (Marsaja, 2008: 168–9). In the sign language of Providence Island, Colombia, much variation in word order was reported (Washabaugh, 1986: 60). Deaf signers tended to put the verb at the end, but did not use consistent order between agents and patients. Hearing signers were more consistent: they tended to have agents before patients in 99 percent of their utterances. As for the position of the verb, those hearing signers who had deaf family members

placed the verb in final position in 64 percent of their responses, while those who did not have daily contact with deaf people had verb-final order only 23 percent of the time. This difference may be interference from the spoken vernacular: Providence Island Creole, like many other creoles, is characterized by SVO order (Arends and Perl, 1995).

Deaf community sign languages have also been reported to exhibit a variety of word orders. Signers of the first two generations of ISL show no preference for any specific word order. In their responses to a set of thirty video clips, third-generation signers use SOV order more than other orders (32%), but SVO and SVOV are also found (14% and 10% respectively; Meir, 2010). The SVO order might reflect interference from Hebrew. The sign language of Nicaragua showed rapid early change in word order. First-cohort signers used mainly NV or NNV order (that is, sentences consisting of a noun or two nouns and a verb), while second-cohort signers introduced many more orders (Senghas *et al.*, 1997). In older deaf community sign languages, both SVO and SOV orders have been reported as basic. ASL is SVO (Fischer, 1975; Liddell, 1980), and so is Brazilian Sign Language (Quadros, 1999), while German Sign Language is SOV (Glück and Pfau, 1998; Rathmann, 2000).

Although consistent word order for marking argument structure requires no development of special overt linguistic machinery, it does not appear right away in all new sign languages. The variability reported on in the literature shows that there is no one course of development that is necessarily taken by a new language. Additionally, a community might take a few generations before it settles on a specific word order.

10.3.1.1 Prosody and syntax

The syntactic ordering that we found early in the creation of ABSL operates within clauses and phrases. In order to investigate the emergence of how clauses might be organized in relation to one another, we turned to prosody, since it has been established for some sign languages that such relations may be conveyed prosodically, as we explain below. Through the comparison of short stretches of discourse in the language of older second-generation signers with those of signers about twenty years younger, we found differences that revealed more complexity as the language develops, both in the syntactic structure within the clause, and in the prosodic structure that links them (Sandler, Meir *et al.*, 2011).

10.3.1.2 Prosody as a clue to the functions and complexity of utterances

When a linguist or anthropologist takes on the daunting task of describing and analyzing a newly encountered language, prosody is an essential tool, whether it is exploited explicitly or implicitly. Even before we understand the words, the rhythm, intonation, and stress of prosody help us separate

utterances from one another in a discourse; determine whether an utterance has declarative, interrogative, or some other function; and infer when two constituents are connected to one another, through coordination or subordination of some kind.

Prosody can distinguish *Do you want an apple or banana cake?* (two kinds of cake) from *Do you want an apple? Or banana cake?* (fruit or cake) (Pierrehumbert and Hirschberg, 1990). It can signal continuation between a subordinate and matrix clause, as in the conditional sentence, *If it rains, we'll stay home and watch TV*. In this example, there is a rhythmic break between the *if-* clause and the *then* clause, and rising intonation on *rains*, signaling the link to the next clause. Each clause here comprises a prosodic unit called an intonational phrase, marked rhythmically, for example, by phrase-final lengthening, and intonationally by pitch excursions, typically at the edge of the phrase. These cues make the boundaries of intonational phrases salient. While conditionals can be marked by "if," and by different tense marking in the two clauses, as in the "rain" example, these syntactic markers are not required. *You overcook that steak and you're fired!* spoken to a new cook in a restaurant is clearly a conditional utterance.

All natural languages have prosody, and sign languages are no exception (Sandler, 2011, 2012a). Of the three components of prosody, here we deal mainly with rhythm (timing) and intonation, leaving stress (prominence) aside. How is prosody manifested in sign languages? First, the timing, delineating constituent structure, is signaled by the hands, which convey the lexical items. At the end of an intonational phrase, for example, the hands carry phrase-final lengthening – the last sign may be slowed down and enlarged; it may be repeated; or the signing hand/s may be held in place or momentarily withdrawn from the signing space. Facial expression in sign language is comparable to intonation in spoken language (together with head position), both functionally and formally. Functionally, certain facial expressions systematically signal particular utterance types, such as yes/no questions and wh-questions in many sign languages (Zeshan, 2004), topics in American Sign Language (Liddell, 1980), and shared information in Israeli Sign Language (Nespor and Sandler, 1999). Formally, the distribution of facial arrays is comparable to that of intonational excursions, aligning themselves temporally with the edges of prosodic constituents, edges that are marked in sign languages by the behavior of the hands. This alignment of manual rhythm, facial expression, and head position has been found to characterize grammatical prosody in ISL and American Sign Language, distinguishing it from emotional or affective prosody (e.g., Baker-Shenk, 1983; Dachkovsky and Sandler, 2009; Healy *et al.*, 2012).

The face and the position of the head may also signal subordination, offering a critical cue to complex utterances. For example, in the ISL conditional sentence meaning "If it rains, we'll stay home and watch TV," the raised brows and head forward position shown in Figure 10.1a

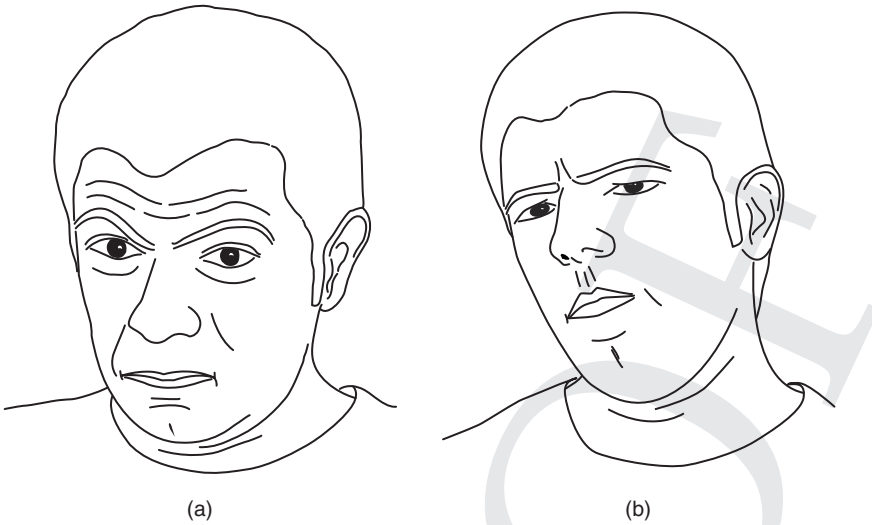

Figure 10.1 Change of intonational arrays at the intonational phrase boundary in ISL: (a) raised brows and head forward signal continuation in the *if*-clause of a conditional; (b) complete change of array in the *then*-clause that follows

are characteristic of *if*-clauses (and other dependent constituents) in that language, marking the dependency relation between it and the *then* clause, whose intonational array in this sentence is shown in Figure 10.1b (Dachkovsky and Sandler, 2009).[7] The manual and non-manual articulations of the prosodic system are recorded by detailed coding of the behavior of each articulator throughout the utterance, shown schematically in Figure 10.1.

We were interested to see whether certain types of meaning and complexity are marked prosodically in the new sign language, ABSL. Through detailed analysis of the prosody in short stretches of narrative in ABSL signers about twenty years apart in age, we discovered two impressive differences between the two age groups (Sandler, Meir *et al.*, 2011). First, the older second-generation signers typically did not connect clauses prosodically: the majority of their utterances were prosodically equivalent to independent main clauses. Among the younger signers, half to three-quarters of the utterances were prosodically complex, with one clause marked as dependent on another. Second, where the older signers used prosodic cues of timing, facial expression, and head/body position sporadically, they were not systematically aligned at identifiable constituent boundaries. The younger signers aligned about twice as many rhythmic cues with changes in facial expression and head position, all of which serve to mark clause boundaries more systematically.

Figure 10.2 shows the final sign of the *if*-clause in a conditional sentence and the first sign of the *then*-clause in the narrative of a younger second-generation ABSL signer. Figure 10.3 shows schematically how the various

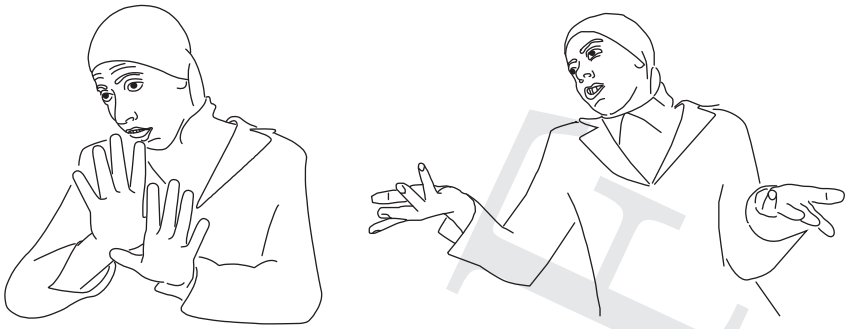

Figure 10.2 Change of facial expression and body posture at the juncture of two intonational phrases in an ABSL conditional sentence meaning 'If he says no, then there's nothing to be done.'

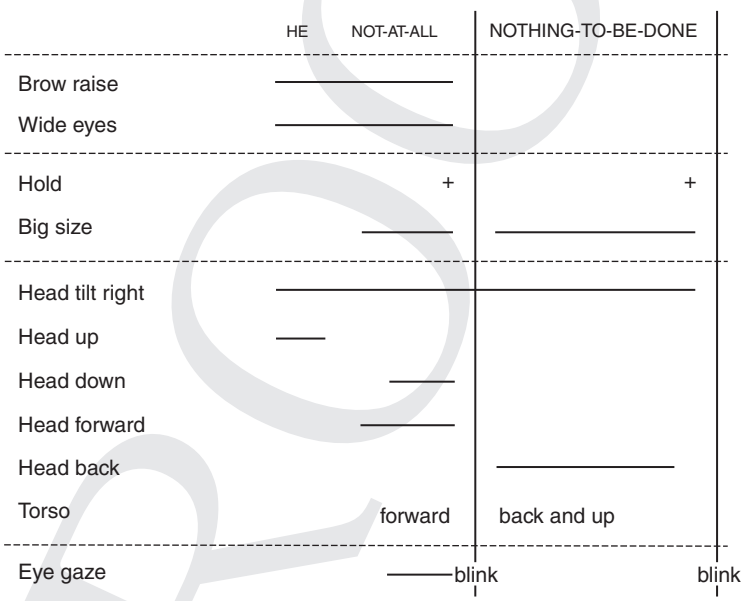

Figure 10.3 A coded example of a conditional sentence produced by a younger signer

articulations are aligned. The example shows both complexity (a conditional sentence) and systematic alignment of prosodic cues. Specifically, the hands are held in place at the end of the *if*-clause. Simultaneously, the brows are raised and the head is forward, marking continuation to the next clause. All prosodic signals change in the following clause. The sentence means *If he says "no," then there's nothing to be done*. Pictured are "no" and "nothing-to-be-done." Such marking of dependent structures was common in the younger signers and rare in the older ones. The investigation showed that prosodic structure can systematically mark complexity, and that the occurrence and co-occurrence of the elements of prosody self-organize gradually across age groups.[8]

10.3.1.3 Syntax of complex utterances

There are no overt syntactic markers in ABSL to indicate sentence complexity, and we remain agnostic about whether the prosodically marked complex propositions are complex sentences in the syntactic sense rather than just semantically linked. However, our analysis of the clauses themselves in the same study shows that the structure of simplex clauses also became more complex for the younger signers. Specifically, for the older signers, many predicates were not provided with explicit arguments, while for the younger signers, most of them were. Also, the younger signers often used pronouns, which associate verbs with arguments in a way that is abstract, with no fixed denotation, but which adds clarity and complexity to the clause. Younger signers were also more likely to use modifiers.

In the early stages of the emergence of ABSL, propositions were simple in structure and typically independent of each other. As little as twenty years later, quantifiably more structure appeared, both within the clause and in the development of dependent relations between them.

10.3.2 Lexicon

It is likely that at least some of the earliest ABSL vocabulary consisted of gestures drawn from the surrounding language environment. But the lexicon of a new sign language goes beyond gesture. Even in the first generation, sign languages start to develop a lexicon of signs that have distinctively different properties from gestures. Kendon (1988) has noted that "gesture" encompasses a range of visible representations of meaning, from gestures that are at once complex and holistic, requiring several spoken words to interpret, to more "lexicalized" gestures, such as the "okay" and "peace" signals, to the conventionalized signs of sign languages, which may become more arbitrary and general in meaning. McNeill (1992) interprets this spectrum as points along a continuum from gesture to language, with gesticulation, which is "global," or holophrastic, a single idea linked to a gesture, on one end, and, on the opposite end, sign language vocabulary items, which are segmented, fully conventional, and combine systematically in sentences.

In established languages, conventional vocabulary items have not only specific meanings, which are learned as one learns the language, they also exhibit grammatical roles, such as subject, object, predicate, and thematic roles like agent, experiencer, source, and goal. Individual vocabulary items typically belong to a grammatical category: noun, verb, adjective, etc. How does a new sign language acquire conventional features that set signs apart from gesticulation?

In ABSL, the notion of subject emerges early, at least by the second generation,[9] in the form of the body of the signer (Meir, Padden *et al.*, 2007). The body of the signer can, but does not always represent the speaker: it can also refer to second or third person. It can represent the agent, but not always. It can alternatively represent the patient or experiencer. It is not

surprising that the body represents the notion of subject, but it is somewhat surprising that it does not always represent the speaker. This is what human languages do: they have conventional grammatical structure, which marks categories and conveys, among other things, shared information in an efficient and effective way.

Established sign languages mark grammatical category in various ways. In some sign languages, the noun category is distinguished from verbs by the movement of the sign. In ASL, nouns are distinguished from semantically and formationally related verbs by a difference in the movement of the sign. Nouns are always reduplicated and have shorter and more tense movement than the related verbs (Supalla and Newport, 1978). The noun TOOTHBRUSH and the verb BRUSH-ONE'S-TEETH are differentiated only in the length and tenseness of the movement. Other sign languages distinguish these classes as well, but ABSL does not exhibit a regular distinction in form between such semantically and formationally related nouns and verbs (Tkachman and Sandler, in press.)

Transitive verbs which involve transfer of an object or a more abstract entity, e.g., GIVE, SHOW, ASK, and SEND, have a characteristic path movement where signs move from one location, the source of the action, to another location representing the goal, e.g., *she gives him* (Fischer and Gough, 1978; Padden, 1988; Meir, 2002). While ABSL uses points in space as a referential device, we have not found movement in space for verb agreement inflection in this language (Meir, Padden *et al.* 2013). Instead, the lexical pattern of body as subject persists regardless of the person categories of arguments within a sentence.

Lexicons may also accrue regularity by iconically associating the location of a sign with parts of the body. For many verbs expressing emotional or physical states, the sign contacts or is near the location on the body that is culturally associated with the state: DREAM contacts the forehead, MOURN is signed near the face, and FEEL contacts the center of the chest.

Second- and third-generation signers of ABSL consistently use a lexicalization pattern for nouns which refer to objects held by the human hand such as TOOTHBRUSH, FORK, KNIFE, SCREWDRIVER, and PAINTBRUSH (Padden, 2012; Padden *et al.*, in press). Hearing non-signers typically pantomime how to hold the object if asked to innovate a gesture for such objects. Adults will hold an imaginary toothbrush and show a back-and-forth movement as if brushing their teeth, or hold an imaginary spoon as they pretend to scoop food from a plate. In ABSL, signers likewise show the action associated with the object, but they consistently use the hands or individual fingers to also show a dimension of the object. In the ABSL sign TOOTHBRUSH, signers use the index finger (depicting the long handle of the toothbrush) while using a back-and-forth movement near the front of the mouth. The ABSL sign for 'comb' can use either two fingers or a clawed hand to show the comb itself or the teeth of a comb as it moves in a

brushing motion near the head. The emergence of a lexicalization pattern by the second generation shows that consistent choice of type of handshape for a lexical category can appear early in the language's developing sign lexicon.

10.3.3 Morphology: The emergence of compounds

Compounding is the earliest type of word formation to develop in the life of a language, and it is accordingly abundant in pidgins and creoles (Plag, 2006). It has also been suggested that compounds are very early precursors to the evolution of syntax in human language (Jackendoff, 2002, 2009). ABSL, as a young language, offers us the possibility of studying the emergence and conventionalization of individual compounds and compound constructions in a community. Our data suggest a correlation between conventionalization in individual compound words and grammaticization of form: those compounds that are more conventionalized are also characterized by more clear-cut structural properties (Meir, Aronoff *et al.*, 2010).

10.3.3.1 How do compounds arise?

Compounding expands vocabulary by drawing from the existing lexicon, using combinations of two or three words to create distinctive new meanings and new lexical items. It is a building process: lacking a lexical item, a language user draws on two or more existing words, which together convey the desired meaning. Under this scenario, three-word compounds are (more) complex, since they use more building blocks.

Our data reveal another previously unrecorded pathway by which compounds emerge, not by building but rather by carving. Signers appear to start out with long unstructured strings of words, and, as these are used more often, they become reduced, finally ending as two- or three-word units. When presented with a concept or an object that they do not have a word for, signers produce a string of words semantically related to that concept. For example, ABSL does not have a conventionalized lexical item for 'calendar', though calendars are used in the community, and one was even noticed in one of the participants' houses. In the picture-naming task, when presented with a picture of a calendar, signers produced the responses in example (1):

(1) (a) TIME + SEE + COUNT-ROWS + WRITE + TIME + CONTINUE + FLIP + SEE + COUNT-ROWS
(b) WRITE + ROW + MONTH + ROW + WRITE
(c) NUMBERS + ROW + MONTH + FLAT-ON-WALL + FLIP
(d) FLIP + WRITE + FLIP

The words in these responses relate to the function of a calendar (telling the time), its arrangement (rows), its internal form (written), its shape

(rectangle), how it is handled (by flipping pages). Responses vary greatly among signers, and they can also vary within a signer from one utterance to another. The example in (d) is produced by the youngest signer in this group (about 20 years old); the expression consists of only two words, encoding its form and how it is handled.[10]

'Calendar' is an extreme example: there seems to be no conventionalization at all across these tokens. Each signer recruits whatever lexical resources s/he can find in order to refer to this concept. Strings of words for other concepts are somewhat more conventionalized. Here, the signers have narrowed down the number of words related to a concept. For 'oven with cooktop', found in every household, signers draw on four lexical items: COOK, TURN, WIDE-OBJECT, INSERT. However, signers vary as to how many and which items they select from this list, as in (2):

(2) (a) TURN^COOK^WIDE-OBJECT
(b) TURN^FIRE^FOUR^BURNER^FIRE
(c) TURN^WIDE-OBJECT
(d) COOK^INSERT
(e) COOK^WIDE-OBJECT

At the other end of this continuum are compounds in which all signers use the same components in the same order. In our data, remarkably, we do not have any one compound that is signed uniformly by all signers in the study. But some signs are conventionalized within a familylect, like the sign KETTLE (Sandler, Aronoff *et al.*, 2011). There are different sign combinations meaning KETTLE, but members of each of two different families uniformly used its own combination consistently (shown in Figure 10.4): (a) CUP^POUR (by handle) as signed uniformly by all three members recorded from one family. (b) CUP^ROUND-OBJECT as signed uniformly by all five members recorded from a different family.

There are many intermediate degrees of conventionalization. In some cases all signers share one lexical component of a compound word, but differ in the others. Signers may share components but differ in their order. Structure emerges when the types of words for describing an object are of similar function, and come in a particular order (e.g., a word describing the function, and a word describing the shape).

The variation we find in ABSL compounds is quite overwhelming.[11] However, we found two structural tendencies emerging in the language, both in more conventionalized compounds. The first, which is stronger, is characteristic of compounds containing a size-and-shape specifier (SASS). SASS signs are common in sign languages in general, though their form and distribution may vary from language to language.[12] There is a tendency in our data for the SASS member to be last. The second weaker tendency is towards a modifier–head order in non-SASS compounds containing a head and a modifier.

Figure 10.4 Two different ABSL compounds meaning 'kettle', each found in a different familylect

10.3.3.2 SASS compounds

In many compounds, one of the signs used to refer to an object is a SASS describing the size and shape of the object that does not occur independently. Some examples follow in (3):

(3) (a) COLD^BIG-RECTANGLE 'refrigerator'
(b) DRINK-TEA^ROUNDED-OBJECT 'kettle'
(c) WATER^ROUNDED-OBJECT 'pitcher'
(d) CUCUMBER^LONG-THIN-OBJECT 'cucumber'
(e) PHOTO^FLAT-OBJECT 'photograph',
(f) CHICKEN^SMALL-OVAL-OBJECT 'egg'

(g) WRITE^LONG-THIN-OBJECT 'pen'
(h) TV^RECTANGULAR-OBJECT 'remote control'

Since the SASSes do not tend to occur as independent words in the language, we may be looking at an early form of affixation in the language. Because we cannot construct criteria for distinguishing the two in this new language, we call the complex forms with SASSes compounds. SASS compounds are widespread in the language: they constitute 37 percent of the compounds in our data set. Figure 10.5 shows some SASS compounds.

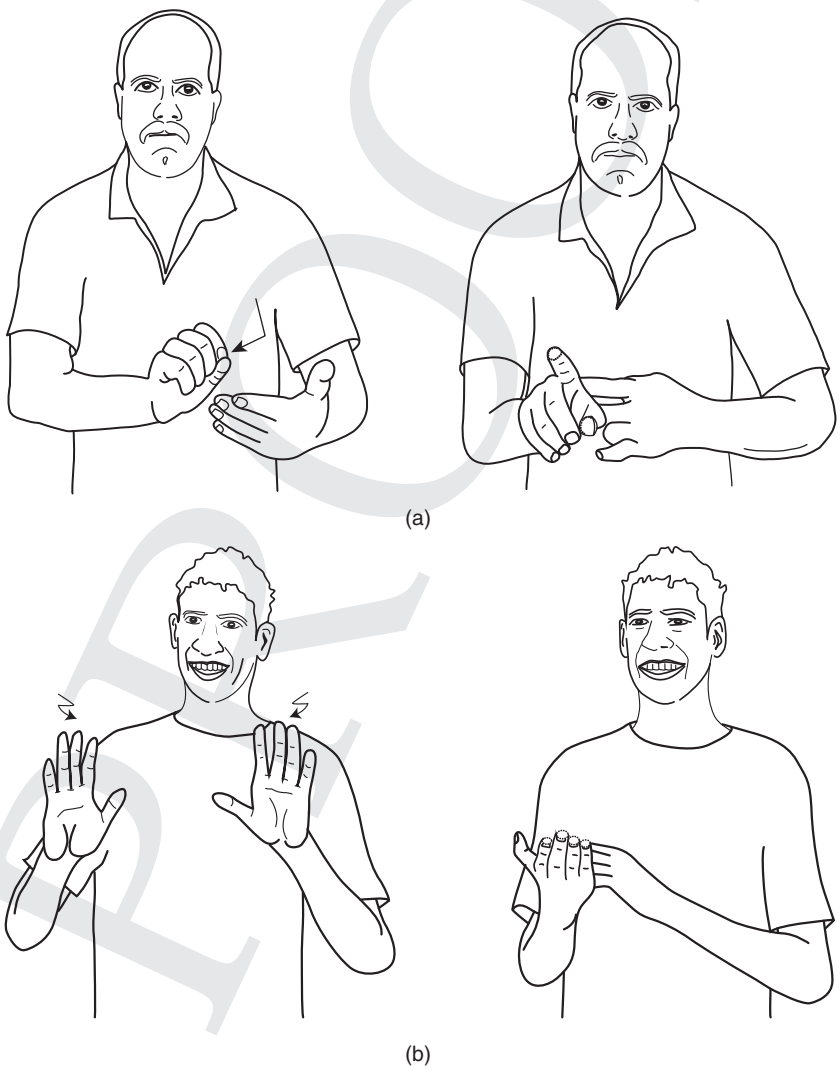

Figure 10.5 Two SASS compounds in ABSL: (a) WRITE^LONG-THIN-OBJECT ('pen'), and (b) TELEVISION^RECTANGULAR-OBJECT ('remote control')

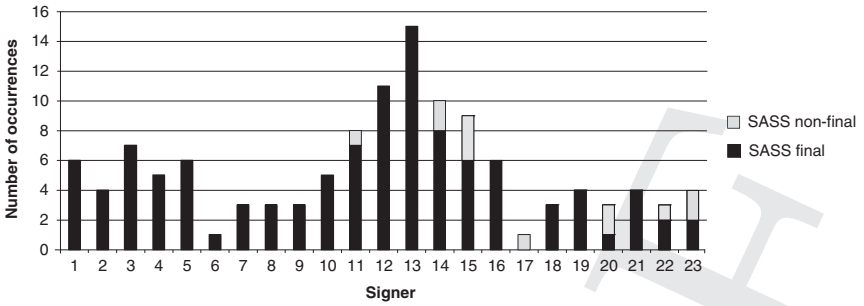

Figure 10.6 Structural tendency in SASS compounds: Number of SASS-final and SASS non-final compounds in the production of each signer

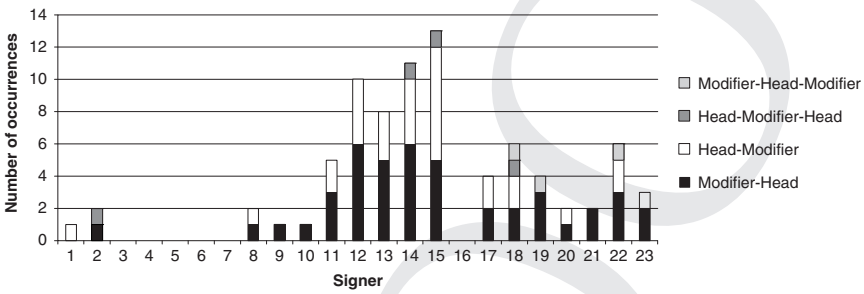

Figure 10.7 Structure of endocentric compounds in ABSL: Head–Modifier order in the production of each signer

These compounds are the most uniform, with a strong tendency for the SASS to occur finally in the compound. This holds both within and across signers (Figure 10.6).

10.3.3.3 Modifier–Head order

The other structural tendency is for a modifier–head order in endocentric compounds, as in (4):

(4) (a) PRAY^HOUSE 'mosque'
(b) SCREW-IN^LIGHT 'light-bulb'
(c) BABY^CLOTHES 'baby clothes'
(d) COFFEE^POT 'coffee pot'

These are less widespread in our data set (22%) than the SASS-type compounds, and the tendency is much less pronounced, for each individual (Figure 10.7) and in the entire set of data (Figure 10.8).

As Figures 10.7 and 10.8 show, the modifier–head order occurs more often than head–modifier order, but the difference is not as striking as with SASS compounds. However, there is an interesting generalization even in this rather messy picture: the endocentric compounds that are most uniform across the population of signers tend to exhibit a modifier–head order.[13] This finding can be interpreted in the following way: there is a high degree of

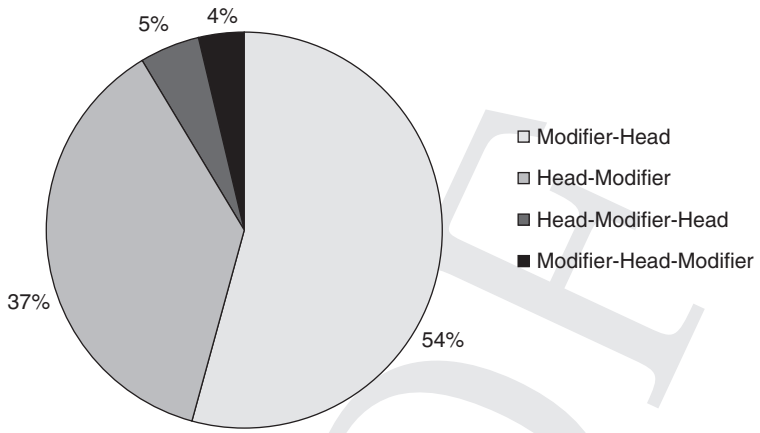

Figure 10.8 Percentage of different Head–Modifier orders in our data

variability, both within and across signers. But compounds that are agreed upon in the community, that is, the most conventionalized ones, tend to exhibit a particular structure. In a way, then, conventionalization may be detected through frequency of use within the community before conventionalization stabilizes in its individual members.

10.3.4 Phonology

The formational elements of signs serve to create contrasts (Stokoe 1960), and their form can alternate in different contexts as a result of formal constraints on the system (Liddell and Johnson, 1986; Sandler, 1989, 1993), irrespective of any iconic properties that may have motivated them. For example, the signs TATTLE and SEND in ISL are contrasted only by the place of articulation: near the mouth for TATTLE and near the torso for SEND (Figure 10.9). The two signs are otherwise identical: a five-finger handshape that opens while the hand moves outward from the body.

Handshape and movement features are also used to distinguish minimal pairs. Indeed, it was Stokoe's discovery of this previously unrecognized characteristic in American Sign Language that brought sign languages into the arena of serious linguistic investigation. Subsequently, linguists discovered other key characteristics of phonology in ASL and other sign languages. For example, although the iconic origin may be apparent in many signs, the inventory of possible locations, handshapes, and movements is as small and discrete as phoneme inventories of spoken languages, and they function in the phonological system without reference to meaning (Sandler, 1989). A good example is assimilation, which systematically alters some phonological feature/s in certain contexts on the basis of form and not meaning (Liddell and Johnson 1986; Sandler 1987, 1989). Well-formedness constraints have also been found.[14] An example of a well-formedness constraint in ASL (Mandel, 1981) is the requirement that only one finger or group of fingers be

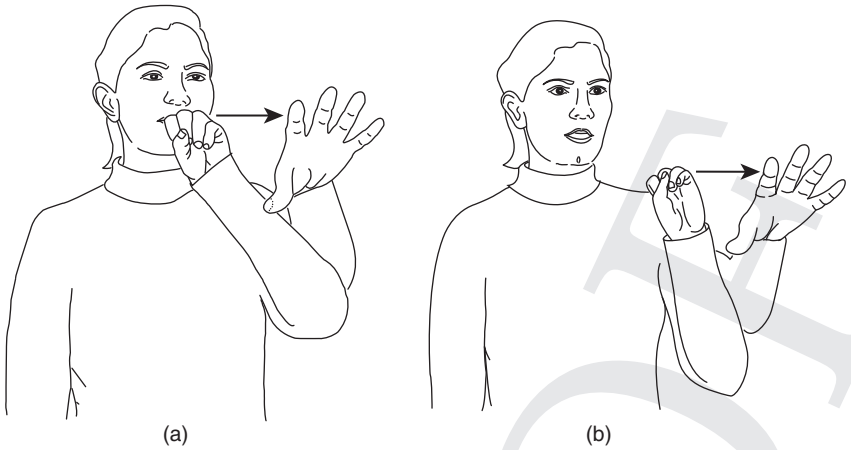

Figure 10.9 The ISL minimal pair (a) TATTLE and (b) SEND

specified for any monomorphemic sign. This constraint holds for ISL as well. In Figure 10.9 above, for example, the handshape changes from closed to open, but crucially the same fingers are selected throughout the sign, in this case, all five fingers.

Hockett (1960) dubbed the existence of two levels of structure – one meaningful and one meaningless – "duality of patterning," and maintained that this is one of the design features that distinguishes human language from other communication systems. Presumably, manipulating forty or so contrastive sounds to create vocabularies of tens of thousands of words is more economical, and distinctions more easily perceived, than if each lexical item were comprised of a global signal.

We were interested to learn whether this property is a mandatory requirement of language, and how quickly it arises. We were especially intrigued because we had observed from the beginning that there was a good deal more lexical variation across the village than we had anticipated, as noted in Sections 10.3.2 and 10.3.3. When signers do use the same sign for a concept, we wondered, was there sublexical variation as well? Do they maintain discrete categories of handshape, location, and movement, as would be expected in a phonological system?

A comparison of the "pronunciation" of fifteen signs across ten signers of ABSL, ISL, and ASL revealed that there is significantly more variation in ABSL than in the other two languages (Israel, 2009; Israel and Sandler, 2011). The variation in ABSL sometimes crossed boundaries of what are major phonological categories in other sign languages, e.g., selected fingers and major body area, in addition to finer-grained variation that might be considered phonetic. An example of the former is seen in two exemplars of the sign for DOG, shown in Figure 10.10, one signed near the mouth and the other in front of the torso. These two categories are distinctive in ISL. Compare TATTLE and SEND in Figure 10.9 above.

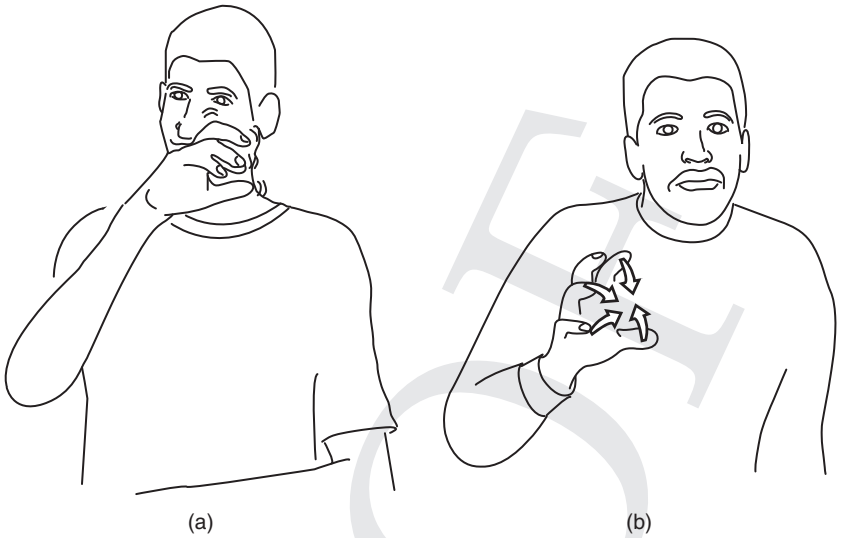

Figure 10.10 Two variations of DOG in ABSL: (a) articulation near the mouth; (b) articulation in neutral space in front of the torso

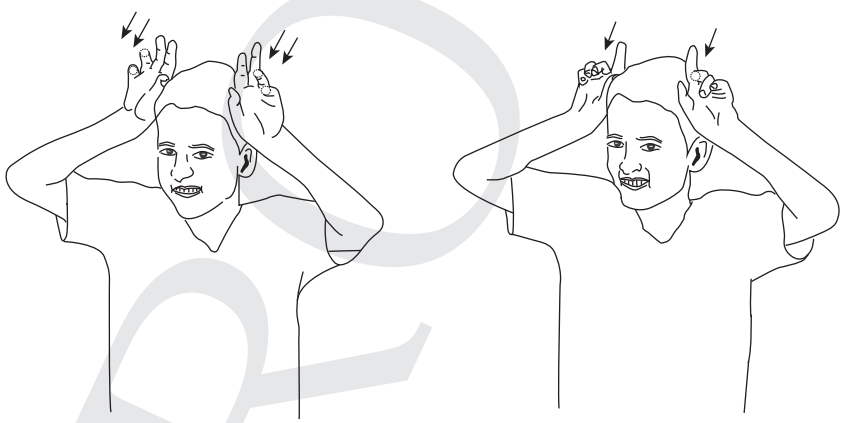

Figure 10.11 Change of handshape within the ABSL sign DONKEY

Furthermore, constraints that are quite robust in other sign languages can be violated in ABSL. In signing DONKEY, for example, a young signer switches from two fingers to one mid-stream, shown in Figure 10.11. Such findings led us to conclude that a full-fledged phonological system has not yet crystallized in the community (Sandler, Aronoff *et al.*, 2011).

Nevertheless, there is an indication that such a system is beginning to evolve. For example, we report instances in young third-generation signers of signs that were produced in a less iconic but more easily articulated fashion, with more comfortable palm orientations or more symmetrical movements than the transparently iconic but cumbersome versions of older people.

Figure 10.12 The conventionalized compound sign EGG in ABSL (CHICKEN^OVAL-OBJECT)

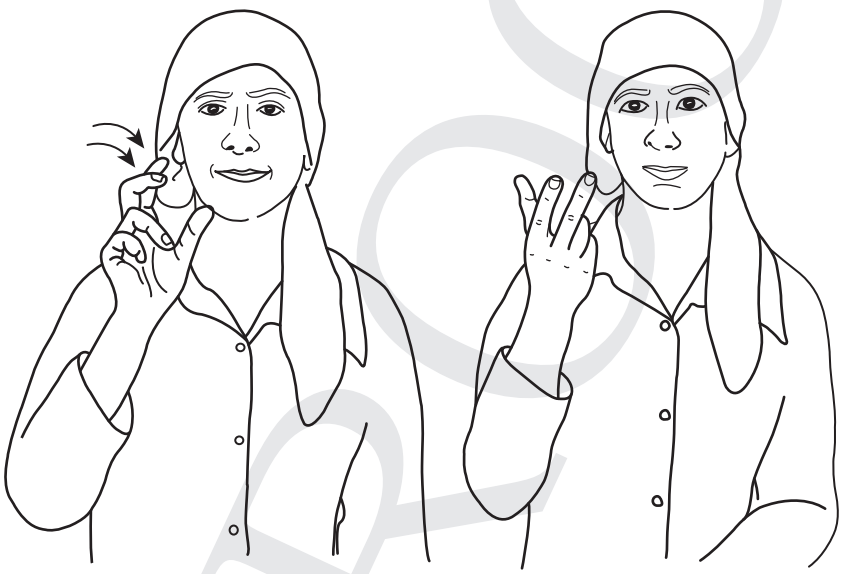

Figure 10.13 The sign EGG with handshape assimilation: three fingers assimilated to CHICKEN from OVAL OBJECT

We also found the beginnings of assimilation and lexicalization that favored meaningless formal elements over global iconicity. The most striking example involves a chicken and an egg. The conventional sign for EGG in ABSL is a compound: CHICKEN^OVAL-OBJECT, shown in Figure 10.12. Each sign is iconic: CHICKEN invokes the pecking beak, while OVAL-OBJECT invokes the shape of an egg and the manner in which it is held. In one familylect, assimilation of handshape occurs in this compound, so that the handshape for OVAL-OBJECT assimilates regressively to the handshape for CHICKEN, the first part of the compound, shown in Figure 10.13. A young

Figure 10.14 The reduced compound sign EGG: only the counter-iconic assimilated version of the first member of the compound survives

girl in this same family, who at the age of about 6 signed EGG like her sister in Figure 10.13, a few years later signed it as in Figure 10.14. The compound had become lexicalized into a single monosyllable whose iconic origin is opaque, combining the handshape of OVAL-OBJECT and the movement of CHICKEN.

While this is an isolated example, we find it interesting because the signer is a third-generation signer with a deaf mother and deaf siblings. Such intensive social interaction in a native language setting is likely to foster the conventionalization and automaticity that we argue underlie the emergence of phonology.[15]

10.3.5 Linguistic identity of the group: accent

Younger deaf people of Al-Sayyid have had varying degrees of exposure to ISL, the language of the majority deaf population in Israel. This exposure has mostly been in deaf education programs in schools, where the contact situation is quite complex. But one thing is clear: there is a good deal of borrowing of signs from ISL into ABSL, mostly among third-generation signers. However, their signing does not look like ISL; there is a signature ABSL "accent."

Contact with ISL began in the 1980s, and has increased with the third generation, when deaf children of Al-Sayyid began to be exposed to signs

from Israeli Sign Language at school, where teachers typically use bare (uninflected) signs from ISL to accompany their speech, either Hebrew or Arabic. That is, the input is pidgin-like and does not convey the grammar of ISL.

In their late teens, a number of boys from Al-Sayyid were exposed to native ISL from deaf teachers at a residential vocational school, while some teenaged girls and young women were exposed to ISL at social meetings for deaf people, whose organizers are ISL signers. In both environments, young deaf people have been exposed to ISL proper (not only to signs from ISL). However, both exposures took place in the late teens and early twenties – long after the critical period for language acquisition.[16] And within the village, older deaf people, pre-school deaf children, hearing family members, and other hearing people maintain ABSL. Communication patterns also favor maintenance of ABSL. Apart from forays into ISL environments, the young deaf people of Al-Sayyid reside in the village, and the vast majority of their communicative interactions take place with their family members, spouses, and neighbors – deaf and hearing. This may not be typical pidginization or creolization, but rather rapid language change in a very young language, affected by borrowing. Still there is no question that many ISL signs have been borrowed into ABSL.

The signature Al-Sayyid accent has several features, the most notable of which is a characteristic rhythmic pattern, which we are currently analyzing. Other features include lax handshapes and wrist and dorsal hand-part prominence. An example of hand-part prominence is found in a young woman's conversation with her sister. She signed the borrowed sign EXACTLY with dorsal hand prominence (Figure 10.15b), while the ISL sign has fingertip prominence (Figure 10.15a). What we find most

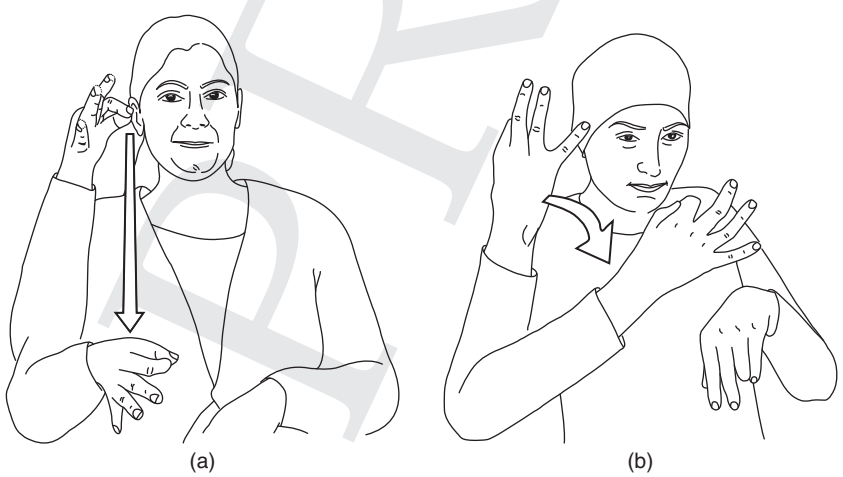

Figure 10.15 (a) The ISL sign EXACTLY with fingertip prominence and (b) the borrowed sign with dorsal hand prominence in the ABSL accent

interesting here is the reflection of group identity through accent, even before a full-fledged phonological system has crystallized.

10.4 Language emerges gradually

When can we call a communication system "a language"? Does language emerge gradually, or is the emergence abrupt, as suggested by some researchers regarding the development of creoles out of pidgins? According to Bickerton (1999: 49), in the plantation-colonies situation, "new languages are formed in the space of a single generation." Kegl *et al.* (1999: 180) write that in Nicaragua, "a signed creole abruptly came into being when the symmetric pidgin/jargon ... became the linguistic input to very young children." Our research on ABSL suggests more gradual development. Yet these questions lead to a more basic question: Is there a set of necessary and sufficient conditions for identifying what a language is? And if so, are these conditions structural or functional?

The literature on the evolution of language makes frequent references to the notion of *protolanguage* vs. *language*. Protolanguage is described as a communication system that is not quite language. Bickerton (1990) suggests that protolanguage is language without syntax. Others (e.g., Jackendoff, 1999; Arbib, 2012) have elaborated on this idea, stating more specifically what it is that differentiates between language and its earlier form as protolanguage. Arbib, for example, defines language as "an open-ended system in which words and then phrases can be assembled according to some grammar that makes it possible to infer plausible meaning for novel utterances created 'on the fly'" (Arbib, 2012: 252). This definition refers to the combinatory nature of language, to hierarchical syntactic structures (words and then phrases), but also to a functional property of language, the fact that novel combinations of words arise effortlessly, "on the fly." However, this definition leaves open what it actually means for a communication system to "have syntax." Does it have to have a basic word order? Not all languages do. Case marking or verb agreement? Overt complementizers? Dependency markers such as anaphors? Parts of speech? Passivization? Relative clauses? For any suggested feature, it is possible to find a language that does not have it (cf. Evans and Levinson, 2009; Bickel, this volume, Chapter 5). Therefore, it seems impossible to define what it means "to have syntax." And if we cannot define that, we cannot identify the point at which a communication system transitions to a language on that basis.

Though having syntax is the main feature referred to when discussing the transition to language, syntax is not the only level of linguistic structure that characterizes language. Languages have lexicons, phonology, morphology, and semantics (Pinker and Jackendoff, 2005). Are these

additional levels of structure also necessary conditions for language? Can we identify a point at which they appear?

Our investigation of the development of ABSL makes two noteworthy contributions to this discussion. First, it underscores the need to distinguish between functional properties of a system and its structural properties. Second, it shows that language does not develop in a unified fashion across all of its domains. Rather, different sub-domains organize at different paces, and therefore a communication system may have some clear characteristics of language in some domains but not in others. We must conclude that the transition into language is gradual and not abrupt.

The need to make a distinction between complexity in the intent and interpretation of a message and complexity in grammatical form was brought home to us by a story told by a first-generation signer, which was videotaped by a villager in 1994, later shared with us. The signer, now deceased, was one of the first four deaf children born in Al-Sayyid. He narrates an event that happened a long time ago, probably before he was born. His narration is therefore characterized by displacement, the ability to refer to events not in the "here and now," a hallmark of human languages (Hockett, 1960). In his narration, he reports on two different discussions between different parties. Though he usually does not use overt reported speech elements, such as "he said that. . .," he manages to clearly convey that he is reporting what others say, and who is speaking, through contextual and mimetic cues. We can say, then, that content-wise he uses reported speech, which is often thought of as a recursive structure. In two instances, his utterances were translated (by his son) as conditional sentences, i.e., embedded structures. Yet the recursion is in the pragmatics, and not in overt syntactic or prosodic structure.

The narration consists of conventionalized signs, and the signer seems to convey the information in a fluent manner, "on the fly," to use Arbib's words (2012: 252). From a functional perspective, this is language. However, there is not much explicit structure in the narrative. Most propositions contain one or two words, there are no function words except for two negators, and the prosodic structure that marks syntactic or semantic boundaries is often hard to identify. In addition, in some cases the meaning of the signing is unclear. For example, when the signer signs: SHOOT. HORSE FALL. EYE FALL-OUT, it is not clear (not even to his son) whether it is the eye of the horse or the eye of the rider that fell out. It is certain that shared context and cultural memory of the narrative goes a long way toward facilitating intelligibility, as one would expect to have been the case at the dawn of language in our species.

Narratives of second-generation signers are more fluent and much less ambiguous than that of the first-generation signer. Although we find only basic clausal structures in these narratives, functionally, they are rich and interesting accounts, referring to old customs of the tribe, to abstract

concepts, such as dreams, and to reports on what other people have said. Are these narratives manifestations of language? They certainly act like language, even though the structural complexities are not evident.

We turn now to the second point, that languages develop in a gradual and non-unified way. Our study of ABSL compounds illustrates this point. First, the variation in compound production in the community shows that conventionalization takes time, and that some items are conventionalized more quickly than others. In addition, structure emerges in some types of compounds, but not in others. The compounds that include a SASS component tend to be SASS-final. Compounds for place names containing a locative pointing sign are also consistent in order of signs: the pointing sign is always final (Meir, Aronoff *et al.*, 2010). Yet other compounds in which a head can be identified are much less consistent. These data show that even within a very restricted domain of grammar, compounding, conventionalization and structure emerge gradually. Different items exhibit different degrees of conventionalization, and some sub-domains show clear structural preferences while others do not.

The SASS components are good candidates for developing into derivational affixes, since they recur with many different bases, and they do not occur as independent lexical items. Since they refer to objects, they may be nominal affixes. If we find good evidence for such an analysis, the implication is that there are formational differences between nouns and verbs in a specific lexical domain. In other words, we would have evidence for the emergence of parts-of-speech distinctions in the language. Yet once again, this grammatical machinery characterizes only a very restricted domain in the ABSL lexicon. Other distinctions or markers may emerge in other language domains.

The picture that emerges is one of varying developments in the language, taking place at different paces. Eventually many of them can interact, and create larger linguistic sub-domains. But by looking at the way ABSL develops and changes, we find evidence for gradual and non-uniform emergence of linguistic structure. We find no evidence for the idea of a sharp leap from non-language to complex language in the first or second generation of signers.[17]

10.5 Conclusions

When we first visited the village of Al-Sayyid a decade ago, we came with strong preconceptions of what a language emerging in such an intensive linguistic environment would look like and of how its structure would unfold across generations. In the context of ambient notions about universal grammar, about rapid creolization, and about what we took to be sign language universal properties, we expected specific types of complex grammatical structure to develop quickly and uniformly across the

Al-Sayyid village. Few of those ideas have survived our years of research on the ground.

We have concentrated on the most surprising of our findings: the differences in the pace of structuration across the components of the language. Word order emerged early and robustly, and other aspects of syntactic structure, evidenced mostly in prosody, have been slower to organize, although we see major differences between older and younger signers in the extent to which prosodic signals align with constituents and mark dependency relations among them. We have not found the agreement morphology that we thought would arise quickly because it is so iconic and pervasive among established sign languages (Aronoff *et al.*, 2005). We have found compounds but the apparent paths to structure among them have again been gradual and unexpected, with islands of regularity both in individual compound words and in the constructions around which compounds cluster. Here the roles of the family and community in shaping the language are also clearest. The organization of the sign medium itself has held the greatest surprises. We have not found evidence of phonological structure in the earliest forms of the new sign language, structure that is well documented in more established sign languages: systematic manipulation of meaningless features in phonological categories of handshape, location, and movement. Instead, the degree and types of variation in sign form we have found suggest that signers are often aiming for a holistic image. At the same time, ABSL signers appear to have a characteristic accent that cuts across the various signs and extends to the signs that they borrow from ISL. Finally, although ABSL lacks complex grammatical structure, its signers never appear stymied. Driven by the human need to communicate with others and armed with the cognitive capacity to do so and with a wealth of shared experience, they use their language to express all the aspects of their lives.

While the specific details of these findings are couched in structural descriptions of sign language, the only kind of contemporary language that arises *de novo*, the findings offer a rare glimpse into the emergence of language more generally. They show that complex communicative interaction arises almost immediately, while the development of conventionalized linguistic structure to scaffold it is gradual, uneven across different components of grammar, and sensitive to social factors such as familylect, community identity, and frequency of use.

Acknowledgments

This research is funded by the US National Institutes of Health grant number R01 DC006473 and the Israel Science Foundation grants number

553/04 and 580/09. We thank Shai Davidi for video images, Debi Menashe for illustrations, and Calle Börstell for editorial assistance.

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