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The roots of linguistic organization in a new language*

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It is possible for a language to emerge with no direct linguistic history or outside linguistic influence. Al-Sayyid Bedouin Sign Language (ABSL) arose about 70 years ago in a small, insular community with a high incidence of profound pre-lingual neurosensory deafness. In ABSL, we have been able to identify the beginnings of phonology, morphology, syntax, and prosody. The linguistic elements we find in ABSL are not exclusively holistic, nor are they all compositional, but a combination of both. We do not, however, find in ABSL certain features that have been posited as essential even for a proto-language. ABSL has a highly regular syntax as well as word-internal compounding, also highly regular but quite distinct from syntax in its patterns. ABSL, however, has no discernable word-internal structure of the kind observed in more mature sign languages: no spatially organized morphology and no evident duality of phonological patterning.

Under the right conditions, it is possible for a language to emerge with no linguistic history. Because it arises spontaneously, unfettered by established structural convention, a language of this kind may reveal some of the most fundamental properties of human language. While all known spoken languages are either old or descended from old languages, sign languages used by deaf people do occasionally arise de novo when a number of deaf people are born into a community and, over time, have an opportunity to gather and communicate regularly.[1]

One cannot extrapolate directly from what we know about present-day new languages to protolanguage. Any observable new language necessarily reflects the linguistic abilities of fully modern humans, not of those who spoke or signed protolanguages. But one would still expect the most youthful of modern languages to be closer to protolanguage than other languages are, because it has come into being without a direct linguistic model.

For the last six years, we have been privileged to be able to study Al-Sayyid Bedouin Sign Language (henceforth ABSL) and document its linguistic structure

(Aronoff, Meir, Padden, & Sandler, 2004; Sandler, Meir, Padden, & Aronoff, 2005). ABSL arose in a small, insular, endogamous community with a high incidence of nonsyndromic, genetically recessive, profound prelingual neurosensory deafness (Scott et al., 1995). The community is ≈200 years old and now in its seventh generation. The first deaf individuals were born into the fifth generation of the community, about 75 years ago, and the number of deaf people in the village now numbers ≈100 (in a population of ≈3500). Our evidence of the language of the first deaf generation (which numbered fewer than ten) is limited to one short videotape. We have worked with and recorded the language of about a dozen members of the second generation and a similar number of the third generation. We confine our discussion in this article largely to the language of the second generation.

ABSL is remarkable for a number of reasons. It appears to have developed with little or no influence from either neighboring sign languages (Al-Fityani, 2007) or the surrounding spoken languages (Sandler, Meir, Padden, & Aronoff, 2005); it is widely used in the community, with at least as many hearing as deaf users; and neither the language nor the deaf signers are stigmatized in the community.

ABSL did evolve within a fully established culture, which is revealed in its lexicon: many of the concepts encoded in ABSL words come directly from the surrounding hearing community (concepts like the lunar month, the days of the week, terms for concepts from Bedouin law, etc). The fact that ABSL developed so fully so quickly is surely due in part to the existing rich cultural base. It is also possible that the existence of syntactic compositionality in ABSL is somehow due to the fact that the surrounding community already had a compositional language at their disposal, a conjecture that we can find no way to test. We find, however, that the actual linguistic structure of Arabic has not influenced ABSL.

A wide variety of linguistic events that we have witnessed show that the language fully meets the communicative needs of its users. We have recorded long narratives in natural settings, including folktales and personal histories; we have also recorded extended conversations between pairs of interlocutors; and we find that speakers are able to communicate to one another very specific bits of information.

In the absence of a structural definition of what constitutes a completely developed human language, ABSL's functional versatility and the absence of any apparent difficulty in communication, combined with its acceptance as a second language of the community, lead us to conclude that it is a bona fide but very new human language. In that light, it is noteworthy that ABSL fails to display at least one basic property that others have ascribed to protolanguage, duality of patterning. Our point of departure is Jackendoff's (1999) model of protolanguage, which differs from Bickerton's original (1990) model in allowing the concatenation of symbols, and which crucially ascribes to protolanguage a combinatorial phonological system. Here, Jackendoff is joined by Lieberman (2006) and Carstairs-

McCarthy (1999), both of whom argue that phonetic and phonological structure preceded syntax.

The linguistic expressions we find in ABSL are neither exclusively holistic nor compositional, but a combination of both. Although we do not dwell on it here, we find (especially in the narratives of older signers) frequent occurrences of depictions of entire propositions in a single unanalyzable unit. For example, in describing an animated cartoon in which a cat peeks around a corner, one signer used his entire body to depict the cat's action. These holistic pantomimes are interspersed with individual signs. The individual signs contrast with pantomimic expressions in several ways: they are conventionalized, much shorter, confined largely to the hands (rather than involving the entire body), and express concepts that are members of individual lexical categories (e.g. noun, verb, modifier) and distributed accordingly in the syntax. This mixing of pantomime and words suggests that the rudiments of language may encode events holistically to some extent, but that compositionality is available as a fundamental organizing principle at a very early point in the life of a language. Nonetheless, we do not find in ABSL at least one property that have been posited as essential even for a proto-language, phonology or its equivalent (Carstairs-McCarthy 1999, Jackendoff 1999, Lieberman 2006).

Duality of patterning

Charles Hockett (1960) identified a number of what he called "basic design features" that appear to be common to all human languages and absent from other natural communication systems. Prominent among these features is "duality of patterning," which is also known as "double articulation" (Martinet, 1960), the existence of two levels of combinatorial structure, one combining meaningful elements (morphemes and words) into larger meaningful units, the other combining meaningless elements (speech sounds) into meaningful elements. The patterning at each of these levels is independent, hence the term duality. For example, the meaningless English speech sounds /t/, /æ/, and /k/ can be combined into the meaningful elements /tæk/ (*tack*), /kæt/ (*cat*), and /ækt/ (*act*), each one of which can be combined with other meaningful elements in expressions like *Have you seen the cat tack act at the circus?* Sign languages, too, show duality of patterning. In established sign languages, the individual signs are not holistic, but are instead each made up of a specific hand configuration, location, and movement, which pattern like the phonemes of spoken languages (Stokoe 1960; Sandler and Lillo-Martin 2006).

Hockett himself suggests that duality of patterning came late in the evolution of language and traced it to the information properties of the vocal-auditory channel and the complexity of the system:

"There is excellent reason to believe that duality of patterning was the last property to be developed, because one can find little if any reason why a communicative system should have this property unless it is highly complicated. If a vocal-auditory system comes to have a larger and larger number of distinct meaningful elements, those elements inevitably come to be more and more similar to one another in sound. There is a practical limit, for any species or any machine, to the number of distinct stimuli that can be discriminated, especially when the discriminations typically have to be made in noisy conditions." (Hockett 1960, p. 95)

Some recent theoreticians have supported Hockett's claim. Nowak and Krakauer (1999) provide a mathematical model of what they call a "linguistic error limit," which is overcome by switching from a system in which each sound is a distinct sign to one that combines sounds into words. Others, though, have suggested that duality of patterning was an important characteristic of proto-language, a precursor rather than a result of complexity, since duality is what permits such a large number of individual meaningful elements to occur easily in a spoken language (Jackendoff, 1999; Pinker & Jackendoff, 2005). The evidence we have amassed in our research on ABSL, however, points away from the systematic meaningless level of structure, although the language clearly has a robust basic syntax and a rich communicative repertoire.

What sort of evidence would show that the language does have duality? First and foremost, minimal pairs — distinctions made by the substitution of a single element, itself meaningless, like the pair *cat* and *pat* in English. Other sign languages do have minimal pairs, distinguished by different handshapes, locations, or movements (Stokoe, 1960). For example, the signs PROFIT and RESTRAINT in
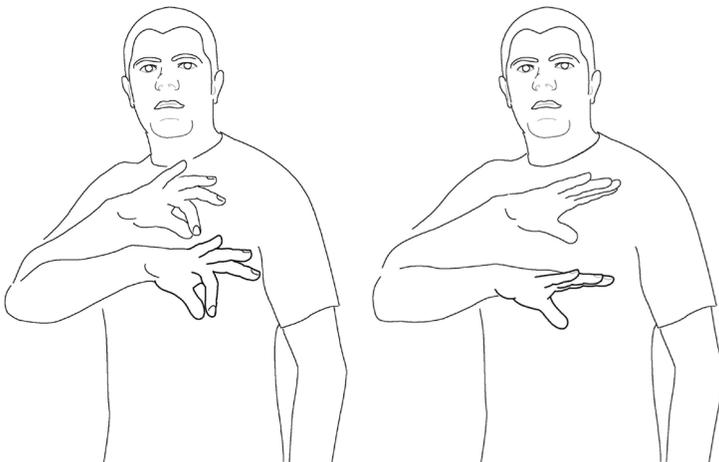

Figure 1. The ISL minimal pair (a) PROFIT and (b) RESTRAINT, distinguished by different handshapes.

Israeli Sign Language share location and movement and are distinguished only by the handshapes ✍ and, ✍ shown in Figure 1.

These two contrastive meaningless elements belong to the relatively small inventory of ISL handshapes, appearing in many signs of the language (Meir & Sandler, 2008). Crucially, neither the handshapes, the location, nor the movement of these signs has independent meaning.

In ABSL, we have as yet not found clear-cut pairs distinguished by a meaningless formational element. We have found some signs with different meanings that are formationally similar to one another, but the difference between them is transparently attributable to iconicity rather than to substitution of meaningless contrastive formational elements. Instead, signs tend to be exemplified by a set of tokens centered around a prototype, where each token of a given prototype may have a different handshape, location, or movement, but conveys the same concept.

An illustrative example is the sign for BANANA. In Figure 2, one signer uses a handshape in which the index finger is selected and in a closed position (fingertip contacting tip of thumb; Sandler 1989), while the other selects all four fingers in an extended position. Figure 3 shows different locations for the sign DOG, one near one side of the face and the other near the center of the chest. Differences such as these, which were revealed through detailed coding of the citation forms of 70 vocabulary items across 15 signers, are not likely to be instances of minor phonetic variation; they would be potentially contrastive in more established sign

Figure 2. Variation of handshapes for the ABSL sign BANANA (a) with ✍ handshape and (b) with ✍ handshape
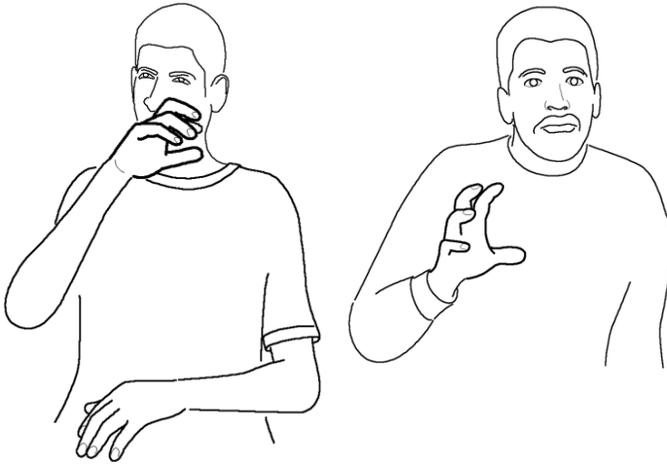
Figure 3. Variation of locations for the ABSL sign DOG

languages that we have studied, as Figure 1 shows for the two handshapes in ISL (Dachkovsky, 2006; Israel, in preparation), and they involve differences in gross articulatory features that are hypothesized to be the first to make distinctions in a sign language. Apparently, handshape, location, and movement do not constitute a discrete set of meaningless building blocks that combine and recombine to create meaningful words in ABSL.

This lack of duality suggests that Hockett may be on the right track: duality is not an essential property of human languages, but rather arises when the number of contrasting signs in a system reaches a threshold.

Prosody

 Prosodic structure (rhythm and intonation) rarely features in more comprehensive models of language and protolanguage. Our experience indicates that prosody's role in designating constituent boundaries, marking relations between constituents, and conveying crucial pragmatic functions of utterances should not be overlooked. In a new language, prosody may be the only marker of these basic constituents, relations, and functions, revealing their existence in the absence of other devices.

Our first challenge in facing ABSL as linguists was to segment utterances into constituents. Beginning with semantics (aided by the translation of a bilingual signer), we grouped words together. But sometimes grouping ambiguities arose, and here prosody served to disambiguate parses. According to the model developed on the basis of Israeli Sign Language in Nespor and Sandler (1999), different

types of prosodic constituents are marked by particular prosodic cues. Only the major constituent breaks, termed intonational phrases in the technical literature, will concern us here. The main cue to these breaks is a change in head and/or body position, accompanied by change in all aspects of facial expression and often by an eye blink. These cues typically coincide with rhythmic effects in the manual part of the signal, such as pauses, and together these cues demarcate the kinds of strings that typically constitute intonational phrases (e.g., topics, the two parts of conditionals, nonrestrictive relative clauses, etc.; see Nespor & Vogel, 1986).

Following studies on ASL (Padden, 1990; Reilly, McIntire, & Bellugi, 1990; Wilbur, 1990), investigations of Israeli Sign Language have refined the claim that facial expression in sign language is comparable to intonation in spoken language by demonstrating functional and formal similarities between the two (Nespor & Sandler, 1999; Sandler, 1999, 2005; Dachkovsky & Sandler, 2008). For example, intonation in spoken language and its facial counterpart in sign language (Sandler, 1999, 2005) indicate whether an utterance is a polar question, a wh-question or an assertion, and cue the relationships between the current string and preceding and following strings, and between the current utterance and perceived beliefs of the addressee (see, e.g., Gussenhoven, 2004; Pierrehumbert & Hirschberg, 1990). At the formal level, changes in facial expression are temporally aligned with the same breaks at which intonational excursions are most conspicuous in spoken language.

In our analyses of ABSL, we look for prosodic cues to help us parse strings in the language. Concomitantly, we attempt to confirm our analysis into constituents through work with ABSL consultants who have some proficiency in Hebrew. This strategy pays off, providing a way to resolve parsing ambiguities and a pathway to the analysis of the language.

For example, in a story about getting married and building a house, a man signed MONEY COLLECT BUILD WALLS DOORS. Here we have two verbs, COLLECT and BUILD, with related nouns. Both the semantics and the prosody grouped MONEY COLLECT together into an OV clause. But what of BUILD WALLS DOORS? Is this an atypical VOO structure or a verbal clause, followed by a list fragment? The prosody solved the problem. After signing BUILD, the signer held his hands in place, moved his body forward and up, changed both his facial expression (from eye squint to neutral) and direction of gaze. Taken together, these cues signaled that BUILD was in a different major prosodic constituent from WALLS and DOORS. The independently recorded translation to Hebrew by a hearing consultant from the village confirmed our analysis. His translation was, 'I saved some money. I started to build a house. Walls, doors…' (Sandler, Meir, Padden, & Aronoff, 2005). This indicates not only that our analysis was correct, but also that those who use the language avail themselves of the same prosodic cues for parsing it. The first
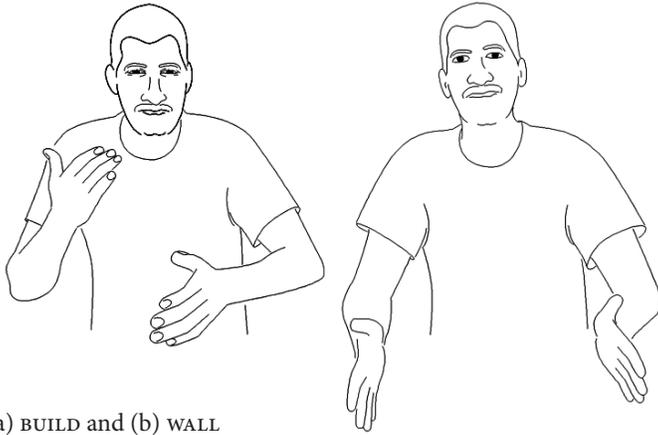
Figure 4. (a) BUILD and (b) WALL

constituent, BUILD, and the first sign of the following constituent, WALLS, are illustrated in Figure 4.

Although we have found very few syntactic markers in ABSL — no subordinators, relative pronouns, or other complementizers, no lexical forms to mark conditionals, no syntactic structures to mark questions, all of these functions are expressed in the language. Through painstaking slow-motion viewing of a conversation between two women and analysis by means of a minutely detailed coding system, we have been able to identify some consistent prosodic markers of syntactic structure, one of which we illustrate here. Not only do prosodic signals serve to separate clauses into intonational phrases, they can also link them to one another to form complex propositions. This linkage is typically signaled by raised eyebrows and head/body forward or down at the end of the first constituent, followed by a change in head/body position and facial expression for the next.

In Figure 5, the conditional interpretation of the first clause is conveyed by raising the brows and tilting the head forward on the sign (IF) NO ('if he says no'), illustrated in Figure 5a. Facial expressions are coded by a certified coder of FACS (Ekman & Friesen, 1978). The layperson can identify the raised brows by the telltale lines in the forehead in 5. The conditional clause is followed by a blink and change in head and body position for (THEN) NOTHING-TO-DO, illustrated in Figure 5b. This prosody is found consistently on conditional constructions in ABSL, as well as on other dependency constructions such as *when-* clauses and temporal adverbials. In a one-minute excerpt analyzed from this conversation, there were five dependent constructions marked with the same basic prosodic pattern.

We have identified no sign for 'if' in this language, and no other overt syntactic means for identifying conditionals — it's all in the prosody. Other sentence types beyond simple assertions, such as sentences with temporal adverbial phrases, questions, and reported speech, are also prosodically marked. In the interpretation
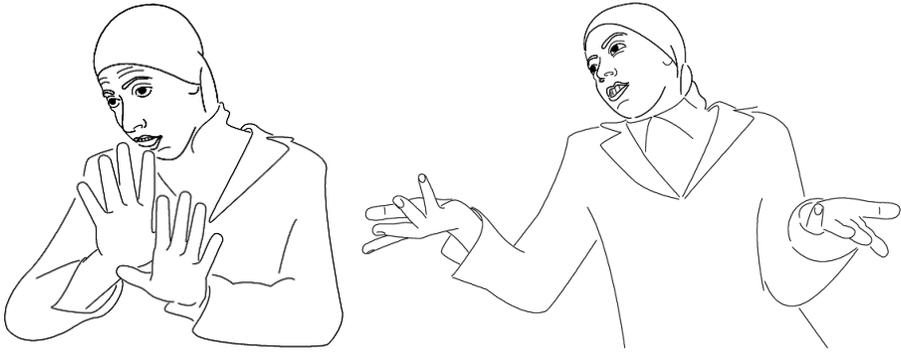
Figure 5.
a. (If) no.
b (then) nothing-to-do.
"If he says, 'No,' then there's nothing I can do about it."

of this conversation, the gloss by itself was unintelligible. Only through prosodic analysis could we fully understand what was meant.

Two lessons are to be learned from this. First, while some languages have overt syntactic markers like the complementizer *that* or the conjunction *if* in the case of English, grammatical complexity can exist without them. Second, this complexity may be encoded in the prosody before a language has had time to develop conventional function words or affixes marking syntactic structure. The nonmanual signals involved in the prosodic systems of sign languages pattern like rhythmic and intonational elements in spoken language prosody, and not signs or words (Sandler & Lillo-Martin, 2006). While we have no way of knowing whether language developed on an evolutionary scale in the same way, these findings do indicate that prosody is a fundamental element in language, marking linguistic complexity early on, and suggest that a model of proto-language should include a prosodic component.

Syntax

Syntax combines discrete meaningful units — words — into larger units — phrases, clauses, and sentences — in a rule-governed way. In order for a language to have syntax, it must have words and systematic ways for combining them. As we show, ABSL has both. We discuss words first, and then turn to discuss multi-word units: phrases, compounds and sentences.

Words

As mentioned earlier, ABSL has open-ended categories of content words, the equivalent of prototypical nouns, verbs, adjectives and maybe adverbs as well. Its

vocabulary contains conventionalized signs referring to entities, both concrete and abstract, to events (actions and states) and to qualities (properties), also words referring to time periods (DAY, MONTH, YEAR), and to temporal relational concepts, such as YESTERDAY, and TOMORROW. At present, we refer to the different categories of words based on their semantics. In addition to content words, ABSL also has words whose function is more grammatical. ABSL has at least four negating signs: a general negator which we gloss as NO/NOT; two emphatic negators, NOT-AT-ALL and NEVER; and a negator best translated as 'no-need-for'. ABSL also has words denoting quantity, such as MANY, ALL, A-LITTLE, as well as numerals. It has personal pronouns, and at least one discourse marker, used to separate chunks of discourse.

Phrases

In addition to words, we find phrases — word groups functioning as a unit within a clause. Such phrases consist of the head and one or more modifiers. Word order within the phrase is consistently Head-Modifier. When the head is a noun, we find several types of modifiers, illustrated in Table 1. Example (f.3) in the table shows that a modifier can be a phrase as well, yielding a recursive structure of phrase within phrase.

In addition to phrases, ABSL has another type of multi-word referential units, compounds.[2] Some examples are: WATER-BOTTLE, BABY-GOAT, BABY-DRESS, CHICKEN-EGG, WATER-CONTAINER. Interestingly, word order in compounds is typically Modifier-Head, the reverse of that found in phrases. This difference between phrases and compounds indicates that word order is used as a grammatical

Table 1. Types of modifiers in noun phrases in ABSL

| Type of modifier	Example
Noun	KADI BEARD-LONG HAT 'the Kadi with a long beard and a special head-wear'
Adjective	WOMAN FAT 'the fat woman'
Numeral	MAN THREE 'three men', DAY 16 'sixteen days'
Pronoun	MAN I 'my father', WOMAN I 'my mother'
Pointing sign (pointing in the direction of a house or a location in the village)	MAN "THERE" 'the man that lives there' (this pointing sign serves as means for identifying the particular man in question by pointing to where he lives).
Combination of the above	1. WOMAN HEBRON FAT 'the fat woman from Hebron' 2. GIRL GOOD PEASANT JERUSALEM 'a good peasant girl from Jerusalem' 3. BROTHER LEG MAN INDEX1 'the brother of my husband, with the (broken) leg'

means for distinguishing different types of grammatical entities. We will look at compounds in more detail in the section on morphology.

Sentences

Unlike words, compounds, and noun phrases, which are referring expressions, sentences convey information about states of affairs. They convey propositional content, comprised of a predicate and its arguments, in a structured way. When analyzing an undocumented language, one cannot rely on syntax to segment a discourse stretch into sentences, since the syntactic structure is as yet unknown. Therefore, when we started looking for sentences and sentence structure in ABSL, we had to rely on non-syntactic cues to determine sentence boundaries, relying on semantic and prosodic means, as explained above. Once the texts were segmented, certain generalizations emerged.

Our main finding regarding syntax is that (at least for second generation signers) the language has a consistent (S)OV word order. Out of 287 prosodic units in our data, collected from 9 second generation signers in both elicited language samples and in free narratives, 150 units consisted of at least a noun sign and a verb sign, and consequently were regarded as clauses.[3] Out of 150 clauses, 136 are verb final. In transitive clauses, containing both an S and an O, we find that SOV

Table 2. Count by word order type

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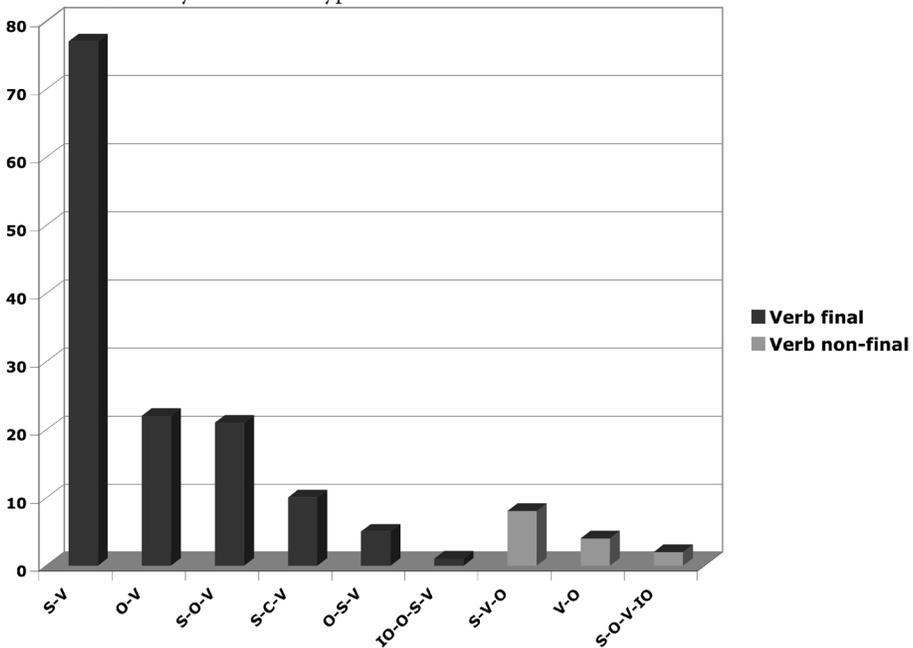
is the predominant word order (Sandler et al 2005, Padden et al in press). The following graph shows the count for each word order type:[4]

In one case SVO order is predominant: when the object is a pronoun, it follows the verb. In the narratives that we collected, 19 sentences had a pronominal object, and all except two had an (S)VO order.[5] The difference in word order between a full noun and a pronominal object may be regarded as evidence that pronouns form a distinct grammatical category in ABSL.

Units larger than a clause

The word order regularities, as well as the evidence for constituents (phrases), described above show that ABSL has syntax. The syntactic structures found in the language, however, are quite simple. Though sentences may contain two or three arguments, there is a tendency towards one animate argument per predicate. Therefore, transitive events involving two animate referents are often conveyed by two or even three clauses. 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.[6] And a woman giving a shirt to a man is described as: WOMAN SHIRT GIVE; MAN TAKE. This tendency is characteristic of all nine signers performing the task.[7]

Breaking an event into sub-events in this way presents the signer with certain choices, such as which participant to introduce first, and which verb to use in order to describe the non-active participant. Interestingly, though all signers use such sequences, the order in which the participants are introduced and the particular way in which the event is broken down into clauses vary greatly.

Consider, for example, the responses to a clip in which a man is showing a picture to a woman:

(1) a. Signer 1: MAN SIT. WOMAN SIT. MAN PICTURE SHOW.
         WOMAN LOOK.
     b. Signer 2: WOMAN LOOK. MAN PICTURE SHOW.
     c. Signer 3: GIRL INDEX. BOY INDEX. SHOW-PICTURE. GIRL
         LOOK.
     d. Signer 4: MAN WOMAN SIT. MAN PICTURE SHOW WOMAN.

Each signer employs a different order in introducing the participants and their actions. The first signer starts with the man sitting; the second begins with the woman looking; the third introduces the woman and then the man, followed by the event of showing the picture; and the fourth describes the man and the woman sitting, and then signs the picture-showing event.

The responses to some clips were more uniform. The events presented in those clips typically have one participant who is stationary, or passive, while the other participant is active. In such cases, there is a tendency in the data to introduce the stationary participant first, and then to describe the active participant and the action. For example, when describing a man tapping a girl on the shoulder, four out of five signers located the girl (or child) first, and then described the man tapping.

The principle governing the order of introducing the participants in the above cases is that stationary participants, who constitute the background of the event, are introduced first (see also Gershkoff-Stowe and Goldin-Meadow 2002). The principle could be stated as "background precedes foreground" (Talmy, 1983). Notice, though, that this principle is cognitive in nature, not syntactic. Crucially, it contradicts the clause-internal word order rule in ABSL, since the stationary object, which is mentioned first, is usually the patient argument which would be the syntactic object if the two arguments were expressed in a single clause. Thus, if an event is described in a sequence of clauses, signers often describe the patient (stationary argument) first; but if the same event is described by a single clause, then the active argument, the agent, is introduced first, typically yielding SOV order.

We find, then, two different patterns of order of participants once we identify clauses: the order of grammatical roles in a clause is subject first, and is very consistent within and across signers, while the order of participants introduced in a discourse is governed by cognitive or pragmatic principles in sequences of clauses and is much more varied within and across signers. These differences suggest strongly that ABSL has syntax, a structural level that cannot be derived from or motivated by principles from another domain.

Recursion

One of the main properties of syntax is recursion, a category embedded within itself, resulting in no non-arbitrary upper bound to sentence length. Since any sentence can be embedded within another sentence such as "Mary thinks that (sentence)", "My mother said that (sentence)", there is no such thing as 'longest sentence'. Is there evidence for recursion in ABSL?

First, there is recursion within the NP, as example (f.3) in Table 1 above illustrates: an NP (MAN I 'my husband') is contained within a larger NP (BROTHER MAN I 'the brother of my husband'). At the sentence level, we do not find overt syntactic markers such as complementizers introducing embedded clauses, but we do find that signers convey messages which are multi-clausal in nature, such as conditionals described above ('If S, then S', where one sentence is dependent on the other,), adverbial clauses with similar dependency ('When I see him, S') and reported speech ('John said that S'). These communicative functions can be found even in

very early stages of the language. For example, a short videotape that is the only extant record of the signing of the first generation contains discourse segments that are translated by a hearing signer as reported speech and as a conditional clause. As we explained above, a dependency relationship between clauses is marked by prosodic and other nonmanual signals, not by manual signs. We conclude, then, that human communicators give overt expression to functions that are essentially recursive from a very early stage in the life of a language. But systematic morpho-syntactic means to mark recursion must take time to develop.

Morphology

We turn now to evidence that ABSL words have meaningful internal structure. The first and most obvious set of complex words in ABSL are those that combine two signs in a single form. These often appear when ABSL signers identify pictures of objects in a vocabulary list. One common set of such forms is city, country, or other place names such as LONG-BEARD+THERE 'Lebanon,' HEAD-MEDALLION+THERE 'Jordan,' and HEAD-SCARF+THERE 'Palestinian Authority.' On close analysis, these are not simply combinations of signs executed in sequence; the movements of the component signs are noticeably changed. The movements are abbreviated, resulting in a form that is less a combination of two signs than a fluidly complex form. While the source components are still evident in the compound, the two signs in this set are not separated by an obvious transition, as would be found between two individual signs in a sentence.

Further evidence that these forms are not simply made up of two signs in rapid sequence, but result from a process of word creation can be seen from the meaning of the compound forms. The sign HEAD-SCARF is used as a single sign elsewhere in the language to refer to the *kafiyeh* commonly worn by Arab men throughout the region, but the compound form HEAD-SCARF+THERE, refers specifically to the Palestinian Authority (the West Bank and Gaza), and to cities located in those areas, such as Hebron. The sign LONG-BEARD describes facial hair, but in the compound LONG-BEARD-THERE, the form loses this specific reference and comes to mean Lebanon.

As we noted in the section on syntax, compounds in ABSL are not freely ordered, but follow particular internal sequences. In the set of compounds referring to countries and places, the lexeme THERE always appears word-finally after a descriptor. In compound signs referring to objects of a sub-type, such as: METAL+HOUSE 'house made of corrugated metal,' BABY+DRESS, 'a baby's dress,' BABY+GOAT, 'baby goat,' CHICKEN+EGG, 'chicken egg,' the modifier typically precedes the head, indi-

cating that ordering of lexemes within a sign is an important property of morphological structure in this new language.

Compounding is a particular kind of complex form. It expands vocabulary in the language by drawing from the existing lexicon, using combinations of two or three signs to create distinctive new meaning. It takes advantage of linear ordering, which we have argued elsewhere to be an important early characteristic of a new language. Just as there is consistent word order in ABSL syntax, there is consistent but different order of lexemes within the word. But compounds also involve reorganization and restructuring: in ABSL conventionalized compounds, movements are changed and reduced, resulting in a new word, often with somewhat idiomatic meaning, making such forms morphological, not syntactic.

The prolific presence of compounds in a new sign language should not be surprising; Ingo Plag (2006) lists compounding as one of several predominant processes found in pidgins and creoles. In contrast, Plag finds that new languages generally have far fewer affixes than their lexifier languages. Does ABSL follow this same trend? Is there a principled difference between the types of morphology that are found in newer languages and in more established ones, regardless of modality?

One category of inflectional morphology in sign languages that has been described as a kind of affixation is number and person agreement on verbs (Padden, 1988). Verb agreement is widely found in ASL and in established sign languages of Europe and Asia and involves changing the form of the verb depending on the number and person of the subject and object (Aronoff, Meir, & Sandler, 2005). While pervasive, agreement morphology in sign languages is typically restricted to a subset of verbs, those that semantically involve transfer between two entities (Meir, 2002). Iconically, the verb appears to mimic the direction of transfer, and moves between the source and goal. Syntactically, in one subset of verbs including verbs like GIVE, SEND, INFORM, FEED, the form of the verb begins first at the location of the subject and moves to the location of the object. First person location is near the signer's body, second person is opposite and near the addressee and third person is any space other than that used for first or second. If the verb is marked for third person subject and first person object, the direction of the sign is from one side of the signer inward to the signer's body. If the verb is marked for first person subject and third person object, then the direction is opposite. Figure 6 features an example of an ASL verb form, 'he gives him,' in which the direction of the movement is from one side to the other, marking first the position of third person subject, then the position of third person object.

For a subset of transfer verbs where the source is not the subject but the object, such as TAKE or INVITE, the direction of the verb reverses and the movement is from the location of the object to that of the subject. Called "backwards verbs," such forms are found in many unrelated sign languages (Padden 1988, Meir 2002).
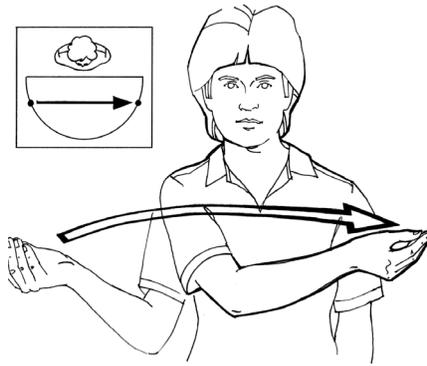
Figure 6.

As part of a task to elicit such verbs in ABSL, nine second-generation signers described short events featured in a series of video clips to another ABSL signer.[8] Eleven of these events depicted actions involving transfer between two entities: GIVE, THROW, CATCH, TAKE and FEED. Contrary to principles of either verb agreement or purely iconic mimicry, the direction of the verb forms did not reflect the transfer shown in the video. Though the video showed an act of transfer from one individual standing on one side of the screen to another standing on the other side, ABSL signers more often signed a path movement from the center of their own body outward in verbs for which the subject is the source of the action, as with GIVE, THROW and FEED, and center-in if the subject is the goal, as with TAKE and CATCH (Aronoff et al 2004). Of the 110 forms produced by ABSL signers in response to these video clips, 98 involved movement from the center of the body outward or inward.

A smaller number of responses, 12 out of 110, involved a shift from side to side rather than along the center-out/in plane. On closer analysis, those appeared not to be like the others, but rather involved moving an object from one location to another, not transfer from one person to another. Because the majority of ABSL signers' responses to actions of transfer did not vary in direction depending on the person of the subject and the object, we conclude that ABSL does not yet have person inflection. The absence of person inflection fits the prototype of pidgins and creoles: while inflectional affixes are not always absent from new languages, they are quite uncommon (Bakker, 2003; Plag, 2006).

Conclusion

ABSL is as new a language as we are likely to encounter. This young language already has an open-ended conventionalized lexicon and structural means for

expanding it (compounding). It has systematic ways of concatenating its lexical items, and of distinguishing between different types of larger units (for example, the different word order of heads and modifiers in compounds vs. phrases). Phrases can be embedded in other phrases, thus creating hierarchical phrase structure. And dependency relations between clauses are indicated by rhythm, head and body posture, and facial expressions, but not by function words or morphemes. The words themselves, though, do not have internal structure, either phonological or morphological (except for compounding).

What can these findings tell us about the evolution of language? First, the existence of certain syntactic mechanisms and the lack of others suggest that language does not appear all at once, but rather develops incrementally. Even syntax is not an "indecomposable bloc"; instead, it builds up over time. This view of language development supports Jackendoff's (1999) model of language evolution. However, the ABSL data also suggest certain modifications to the model. Our findings show that a language can reach the stage of having hierarchical phrase structure, and even some words marking abstract semantic concepts (properties attributed to the post-proto-language stage in the model), without having a stable phonological combinatorial system yet (a property attributed to the pre-proto-language stage).

Jackendoff's model does not elaborate on how constituent structure and multi-clausal dependencies develop. ABSL suggests that prosody plays a crucial role in marking constituents and dependencies systematically from the very beginning. This leads us to conclude that prosody and its interaction with sentence structure should be incorporated into any model of language evolution.

Notes

1. Although contact languages (pidgins and creoles) are not usually viewed as being descended from a single language, they arise from the confluence of two or more existing languages and are hence always influenced by such languages in a way that new sign languages are not.

2. Compounds were elicited by a naming task. Subjects were shown pictures of everyday objects, and were asked to name them. Responses that consisted of more than one sign and were uniform across different signers were regarded as conventionalized compounds.

3. The remaining 137 units consisted either of single noun or verb signs, or of sequences without verbs, such as noun + location or noun + description. A small number of elicitations were unclear, and were excluded.

4. In the order type labeled "SCV", the C stands for a complement of the verb which is not the patient argument, such as an instrument ('feed with a spoon') or location ('tap somebody on the shoulder'). Such arguments, whose syntactic role is still unclear, pattern with the patient argument (the syntactic O) in that they precede the verb.

5. Of these two sentences, one had a locative pronoun (I THERE SIT), and in the other the object pronoun was emphasized. We do not know as yet whether these factors affect word order.

6. Senghas reports a similar structure in older signers of the new Nicaraguan Sign Language (Senghas, Coppola, Newport, & Supalla, 1997).

7. For example, 5 signers described a set of 18 clips showing a transitive event. The signers used 235 clauses to describe these clips (instead of 90), 115 of which contained one argument, 54 with two or three arguments, and the rest were sentence fragments. See Padden, Meir, Sandler, & Aronoff (in press) for a comprehensive discussion of the phenomenon and its theoretical significance.

8. As a measure of comprehension, we paired each signer with another ABSL signer. After watching the first signer describe the event in the video clip, the second signer was asked to choose from a set of three pictures for each event description. One of the three pictures correctly depicted the action; the other two had either a different subject or a different action than shown in the video clip.

References

Al-Fityani, K. (2007). Arab Sign Languages: A lexical comparison. *Center for Research in Language Technical Reports, 19*(1), 3–13.

Aronoff, M., Meir, I., Padden, C., & Sandler, W. (2004). Morphological universals and the sign language type. In G. Booj & J. van Marle (Eds.), *Yearbook of morphology 2004* (pp. 19–39). Dordrecht/Boston: Kluwer Academic Publishers.

Bakker, P. (2003). Pidgin inflectional morphology and its implications for creole morphology. In *Yearbook of Morphology 2002* (pp. 3–34). Dordrecht: Kluwer Academic Publishers.

Bickerton, D. (1990). *Language and Species*. Chicago: University of Chicago Press.

Carstairs-McCarthy, A. (1999). *The Origins of Complex Language: An Inquiry into the Evolutionary Beginnings of Sentences, Syllables and Truth.* Oxford: Oxford University Press.

Dachkovsky, S. (2006) ABSL Vocabulary Report. Working paper, Sign Language Research Lab, University of Haifa.

Dachkovsky, S., & Sandler, W., (2007). Visual intonation in the prosody of a sign language. Ms. University of Haifa.

Ekman, P., & Friesen, W. (1978). *Facial action coding system*. Palo Alto, CA: Consulting Psychologist Press.

Gershkoff-Stowe, L., & Goldin-Meadow, S. (2002). Is there a natural order for expressing semantic relations? *Cognitive Psychology*, 45 (3), 375-412.

Gussenhoven, C. (2004). *The phonology of tone and intonation*. Cambridge, UK: Cambridge University Press.

Hockett, C. (1960). The origin of speech. *Scientific American, 203*, 88–96.

Israel, A. (in preparation). Phonetic variation in the signs of ABSL and ISL. MA thesis, The University of Haifa.

Jackendoff, R. (1999). Possible stages in the evolution of the language capacity. *Trends in Cognitive Sciences, 3*(7), 272–279.

Lieberman, P. 2006. *Toward an Evolutionary Biology of Language*. Cambridge, MA: Belknap Press of Harvard University Press.

Martinet, A. (1960). *Éléments de linguistique générale*. Paris: Colin.

Meir, I. (2002). A cross-modality perspective on verb agreement. *Natural Language and Linguistic Theory, 20*(2), 413–450.

Meir, I. Padden, C., Aronoff, M, & Sandler, W. (2007) Body as subject. *Journal of Linguistics*, 43(3), 531-563.

Meir, I., & Sandler, W. (2008). *Language in space: The story of Israeli Sign Language*. New York: Lawrence Erlbaum Associates

Nespor, M., & Sandler, W. (1999). Prosody in Israeli Sign Language. *Language and Speech, 42*(2&3), 143–176.

Nespor, M., & Vogel, I. (1986). *Prosodic phonology*. Dordrecht: Foris.

Nowak, M., & Krakauer, D. (1999). The evolution of language. *Proceedings of the National Academy of Sciences, 96*, 8028–8033.

Padden, C. (1988). *Interaction of Morphology and Syntax in American Sign Language*. New York: Garland Press.

Padden, C. (1990). The relation between space and grammar in ASL verb morphology. In C. Lucas (Ed.), *Sign Language Research: Theoretical Issues* (pp. 118–132). Washington, DC: Gallaudet University Press.

Padden, C., Meir, I., Sandler, W., & Aronoff, M. (in press). Against all expectations: The encoding of subject and object in a new language. In D. Gerdts, J. Moore & M. Polinsky (Eds.), *Hypothesis A/Hypothesis B: Linguistic Explorations in Honor of David M. Perlmutter*. Cambridge, MA: MIT Press.

Pierrehumbert, J., & Hirschberg, J. (1990). The meaning of intonational contours in the interpretation of discourse. In P. Cohen, J. Morgan & M. Pollack (Eds.), *Intentions in communication* (pp. 271–311). Cambridge, MA: MIT Press.

Pinker, S., & Jackendoff, R. (2005). The faculty of language: What's special about it? *Cognition, 95*(2), 201–236.

Plag, I. (2006). Morphology in pidgins and creoles. In K. Brown (Ed.), *The encyclopedia of language and linguistics* (pp. 305–308). Oxford: Elsevier.

Reilly, J., McIntire, M., & Bellugi, U. (1990). Baby face: A new perspective on universals in language acquisition. In P. Siple & S. Fischer (Eds.), *Theoretical issues in sign language research, Volume 2* (pp. 9–24). Chicago: University of Chicago Press.

Sandler, W. (1989) *Phonological Representation of the Sign: Linearity and Nonlinearity in American Sign Language.* Dordrecht: Foris.

Sandler, W. (1999) The Medium and the Message: Prosodic Interpretation of Linguistic Content in Sign Language. *Sign Language and Linguistics* 2:2. 187–216.

Sandler, W. (2005) Prosodic constituency and intonation in a sign language. *Gebardensprachen: Struktur, Erwerb, Verwendung, 13,* 59–86.

Sandler, W., & Lillo-Martin, D. (2006). *Sign language and linguistic universals*. Cambridge, MA: Cambridge University Press.

Sandler, W., Meir, I., Padden, C., & Aronoff, M. (2005). The emergence of grammar: Systematic structure in a new language. *Proceedings of the National Academy of Sciences, 102*(7), 2661–2665.

Scott, D., Carmi, R., Eldebour, K., Duyk, G., Stone, E., & Sheffield, V. (1995). Nonsyndromic autosomal recessive deafness is linked to the DFNB1 locus in a large inbred Bedouin family from Israel. *American Journal of Human Genetics, 57*, 965–968.

Senghas, A., Coppola, M., Newport, E., & Supalla, T. (1997). Argument structure in Nicaraguan Sign Language: The emergence of grammatical devices. In E. Hughes & A. Greenhill (Eds.), *Proceedings of the Boston University Conference on Language Development, 21* (pp. 550–561). Boston: Cascadilla Press.

Stokoe, W. (1960). Sign language structure: An outline of the visual communication systems of the American deaf. *Studies in Linguistics, Occasional Papers 8.*

Talmy, L. (1983). How language structures space. In H. Pick & L. Acredolo (Eds.), *Spatial orientation: Theory, research and application* (pp. 225–282). New York: Plenum.

van der Kooij, Els. 2002. *Phonological Categories in Sign Language of the Netherlands: The Role of Phonetic Implementation and Iconicity.* PhD dissertation, Leiden University.

Wilbur, R. (1990). Why syllables? What the notion means for ASL research. In P. Siple & S. Fischer (Eds.), *Theoretical issues in sign language research, Volume 2* (pp. 81–108). Chicago: University of Chicago Press.

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