Negation as structure building in a home sign system

Amy Franklin, Anastasia Giannakidou
& Susan Goldin-Meadow

We identify a gestural marker for negation in a home sign system: a side-to-side headshake. This marker expresses a meaning that corresponds semantically to a function that applies to a sentence (whose semantic value is a proposition) and yields another, more complex sentence. Combining negation with a sentence involves sentential modification; we therefore propose that the side-to-side gesture is a structure building operator. We show that it systematically occupies a position at the left periphery of the string, isomorphic to the logical syntax. If what we see in home sign is language creation (Goldin-Meadow 2003), our analysis implies that home signs have at least the minimal syntax of negation, and therefore contributes to ongoing debates about fundamental properties of language

1. Introduction: The significance of home signs and negation[1]

Home sign systems are gesture systems created by deaf children whose hearing losses are so severe that they cannot acquire the spoken language that surrounds them, and whose hearing parents have not exposed them to sign language – in other words, gesture systems created in the absence of a conventional language model. Despite the lack of conventional linguistic input, the home signs that deaf children

1. Our paper presents a case of match in home sign between the logical meaning and syntactic position of negation. This is a remarkable result to report in a volume in honor of Jerry Sadock whose fascination with, and engaging study of, mismatchings between syntax and semantics/pragmatics has been so valuable over the decades in deepening our understanding of grammar. We thank Jerry for being the profoundly inspiring colleague that he has been. We have been extremely privileged to have him comment on our ideas through the years (as well as this paper), and to have benefited from his advice and kindness, that he so generously offered. For particular comments on this work, we also thank Larry Horn and the anonymous reviewers for their fine and insightful suggestions. Finally, many thanks to the editors for their patience and for putting together this volume for Jerry.

in these circumstances create exhibit many properties of natural languages, including morphological structures (e.g. hand and motion morphemes that combine to form lexical stems; Goldin-Meadow, Mylander & Butcher 1995; Goldin-Meadow, Mylander & Franklin 2007) and syntactic structures (e.g. operations that combine verbs with their arguments, Feldman, Goldin-Meadow & Gleitman 1978; Goldin-Meadow & Mylander 1998; Goldin-Meadow 2003). The properties that are found in home sign do not need to be handed down from generation to generation but can be invented *de novo* by a child.

Interestingly, it is likely that many, if not all, current day sign languages have their roots in a home sign system. We can, for example, trace the birth of the newly emerging Nicaraguan Sign Language to the period when home signers were brought together for the first time (Kegl, Senghas & Coppola 1999; see also Sandler, Meir, Padden & Aronoff 2005, who describe the birth of another newly emerging sign language, Al-Sayyid Bedouin Sign Language). Home sign systems thus present a unique opportunity to observe and analyze the language creation process, with the potential to offer us important insight into what is fundamental about language.

The debate about what is fundamental to language lies at the heart of current linguistic theory and psychological studies of language. One influential position, assumed by many in the field of linguistics (see, for example, Nevins et al. 2009), is that *recursion* constitutes a basic property of language (Chomsky, Hauser & Fitch 2002; Pinker & Jackendoff 2003). In current terms (Chomsky 1995), recursion can be understood as the property that creates constituents via *Merge*, or, in different systems (e.g. Sadock 1991), syntactic phrase structure rules that combine any two or more linguistic items and create a new one. Recursion is involved in sentence modification (when a proposition is modified by a sentential operation involving, for example, negation, tense, questions, or modal verbs) and in sentence complementation (when a verb takes a sentence as its complement, for example *Bob believes that Bill said that Mary thinks that Amy is sick*).

In the present work, we examine utterances produced by a home signer, whom we call David, that convey negative meaning. We begin with the background on sentence modification necessary to understand our claim that there is a meaning marker for negation developed by the home signer we have studied. Negation is one of the most basic ways to build a complex sentence out of a simpler one: the logical connective ¬ takes a sentence as its input, and gives back a new sentence whose truth value is the reverse of the original sentence. The truth reversal property of negation is identified as *antiveridicality* in Giannakidou (1998, 1999; Zwarts 1995). We illustrate in (1) the proposition embedding property of negation; φ stands for a sentence, ¬ for negation; "→" indicates the mapping from input to output:

(1) Negation: $\varphi \rightarrow \neg \varphi$

Negation does not affect the speech act type of the utterance: if φ is an assertion, then so is ¬ φ. In contrast, the question operator is a also sentential function, but one that alters the speech act type, i.e. it adds the illocutionary force (Searle 1969) of a question: if φ is an assertion, then ? φ is a question (see Franklin, Giannakidou, and Goldin-Meadow 2011, for further study of questions in home sign).

The natural language words *no, didn't, not* in English, and their counterparts in other languages, convey logical negation (see Horn 1989, for extensive discussion of the properties of logical negation and its mapping onto natural language negation), and can thus be called negation markers. Negation markers have been argued to often (but not always) have a syntax that is consistent with their proposition embedding function, and indeed they tend to appear in sentence peripheral positions (that is, preverbally or postverbally); we will have more to say about this in Section 4.

We argue next that the home sign system we studied possesses a grammatical marker corresponding to ¬, and that in employing it, the system applies syntactic modification of the kind we just mentioned that is observed in spoken languages.

2. Method

2.1 Participant

Deaf children born to deaf parents and exposed from birth to a conventional sign language acquire that language naturally; that is, these children progress through stages in acquiring a sign language similar to those of hearing children acquiring a spoken language (Lillo-Martin 1999; Newport & Meier 1985). However, 90% of deaf children are not born to deaf parents who could provide early exposure to a conventional sign language. Rather, they are born to hearing parents who naturally expose their children to speech (Hoffmeister & Wilbur 1980). Unfortunately, it is extremely uncommon for deaf children with severe to profound hearing losses to acquire the spoken language of their hearing parents naturally – that is, without intensive and specialized instruction. Even with instruction, deaf children's acquisition of speech is markedly delayed when compared either to the acquisition of speech by hearing children of hearing parents, or to the acquisition of sign by deaf children of deaf parents. By age 5 or 6, and despite intensive early training programs, the average profoundly deaf child has only limited linguistic skills in speech (Conrad 1979; Mayberry 1992; K. Meadow 1968). Moreover, although some hearing parents of deaf children send their children to schools that teach signed systems modeled after spoken languages (e.g. Signed English), other hearing parents send their deaf children to "oral" schools in which sign systems are neither taught nor encouraged. Thus, these deaf children are not likely to receive input in a conventional sign system, nor be able to use conventional oral input.

The subject of this study, whom we call David, is profoundly deaf (>90dB bilateral hearing loss). His hearing parents chose to educate him using an oral method. At the time of our observations, David had made little progress in oral language, occasionally producing single words but never combining those words into sentences. In addition, at the time of our observations, he had not been exposed to a conventional sign system of any sort. David participated in a longitudinal study by Goldin-Meadow and her colleagues exploring the gestures systems developed by deaf children of hearing parents who are not exposed to conventional sign languages (Feldman, Goldin-Meadow & Gleitman 1978; Goldin-Meadow 2003; Goldin-Meadow & Mylander 1984). As a participant in this study, David was observed over a period of years. Here we focus on eight time points beginning at age 2;10 until 3;11, concentrating on negations and structure building.

2.2 Procedure and Coding

In each session, David was observed in the home playing with his mother, siblings or the experimenter. The same set of toys, including puzzles, mechanical and wind-up toys, and books, were brought to the child's home with each visit. The child was observed on average for 1 1/2 hours per session.

We coded all the utterances produced by David following previous conventions for isolating gestures: (1) the gesture must be directed to another individual, (2) the gesture must not be a direct manipulation of an object, and (3) the gesture must not be part of a ritual act (see Feldman, Goldin-Meadow, & Gleitman 1978 and Goldin-Meadow & Mylander 1984, for discussion). Gestures were classified into one of three categories: (1) *Deictic* gestures indicate objects, people, and locations in the immediate environment and their meanings are context-bound. David produced two types of deictic gestures – hold-ups in which the gesturer holds up an object in the partner's line of sight, and points in which the gesturer extends a finger or palm toward an object. (2) *Conventional* gestures included hand and body movements that were conventional in form and that were associated with conventional meanings in David's hearing community (e.g. shaking the head from side-to-side; flipping downward-facing palm(s) over so that the palm(s) face upward). (3) *Iconic* gestures depicted actions or attributes of concrete or abstract referents via hand or body movements (e.g. moving the index finger in circles to indicate the movements of a rolling ball, or placing two vertical palms on the sides of the head to indicate the shape of a rabbit's ears). Hand gestures were described in terms of handshape, motion, and place of articulation. Non-manual gestures such as head movements (e.g. nods and side-to-side headshakes) and facial expressions (e.g. mouth open) were also transcribed and coded.

Gesture sentences were identified using motoric criteria (Goldin-Meadow & Mylander 1984). A relaxation of the hands or extended pause signaled the end of a sentence. This criterion results in gesture sentences that can be as short as a single gesture or include many connected gestures. Simultaneous gestures include movements of the head and hand produced at the same time (e.g. shaking the head while pointing at an object); in these examples, the nonmanual headshake is indicated above the manual gesture with which it occurs. Simultaneous gestures also include two different gestures, each produced by a different hand (e.g. a point to an object with the left hand and a flip gesture with the right hand.) Manual gestures produced at the same time are indicated in our codes by a plus (+) between the two simultaneously produced gestures. Gestures that follow one another within a sentence are indicated by a dash (–) between the two gestures.

Because the deaf child's gesture system is not a conventional system shared by a community of users, our interpretations represent our best guesses as to the child's intended meaning. Context, including interlocutor responses and the child's reaction to their responses, played a central role in our interpretations. As a result, the communicative functions request-comply, question-answer, and statement-reply were discourse units that informed our analyses, as in the following example produced when David was 3;11. The researcher asks David which toy (a guitar or drum) goes with a toy solider and the child replies that the guitar should *not* be put on the toy solider. The researcher then places the drum on the solider.

(2) Researcher: "Look at that. Look at that. Which one?" (holds up the toy guitar and drum) "Which one goes with him?"
David: side-to-side headshake – point at guitar – PUT ON [O-hand moved down in the direction of the soldier] – point at soldier.
Researcher: (puts drum on soldier)

The child's utterance here is understood in the context of the adult-child exchange. David's response to the researcher's question is that the guitar should not be placed on the solider. We do not attempt to code the children's gestures in isolation; rather we use context and prior interlocutor turns to inform our analyses. In this fashion, utterances by the child can serve to ask questions, exclaim emotions, and make statements.

David produced 3080 gesture sentences within the observed recordings, 60% containing only a single gesture. A number of the sentences (n = 150) were excluded because of taping difficulties that rendered the gestures uncodable (e.g. David had his back to the camera). Each gesture sentence (including single gestures produced in isolation) was classified as a statement, negative statement, question, negative question, or exclamation/emotive expression. We focused on sentences expressing negative meanings. A second coder transcribed and coded a sampling of videotapes

taken across the sessions. Agreement between coders was 89% (N = 148) for glossing or providing the English translation of the gesture sentence, 96% (N = 148) for assigning communicative function to the sentence (statement, negative, question, etc.), and 89% (N = 148) for assigning meanings to specific gestures.

David produced 327 negative gesture sentences, roughly 11% of his sentences. We focus first on the types of negative meanings that David expresses. We then explore the forms that David uses to express negative meanings, and the syntax of negation in his home sign system.

3. The types of negative meanings David expresses

Bloom (1970) identified three types of negative meanings in the early speech of children learning English: rejection, denial, and nonexistence. The category of rejection negations are those in which "the referent actually existed or was imminent within the contextual space of the speech event and was rejected or opposed by the child," as seen in the example 'no dirty soap' produced to reject an unwanted piece of soap. In denials, the negation "asserted that an actual predication was not the case. The negated referent was manifest symbolically in a previous utterance; 'no truck' denied the expressed identity of the car as a truck. " In nonexistence, "the referent was not manifest in the context, where there was an expectation of its existence, and was correspondingly negated in the linguistic expression," as seen in the example 'no pocket,' produced to comment on the absence of an expected pocket (Bloom 1970: 173). We found that David expressed the same three types of negative meanings in his gestures.

3.1 Rejections

We follow Bloom's definition in identifying a *rejection*. This type of negation is used to reject objects, ongoing actions of others, proposed actions by others, or suggestions for actions by the child. A rejection is not a contradiction in the logical sense, but an exertion of will, opinion or preference. Rejections of objects offered by others are common in the play setting. Toys, puzzle pieces, snacks and other objects are passed back and forth. For example, while playing with a group of wind-up toys, the experimenter offers David two toys. David points to one of the two toys and shakes his head to reject the toy. He then requests that the other toy be placed on the board to walk.

(3) side-to-side headshake – point to toy 1 – put down (toy 2)
No, I don't want toy 1, put down toy 2. (3;10, #355)[2]

2. The first number in parentheses is David's age at the time he produced the example; the second is the number of the gesture sentence.

David also rejects the actions of others, as in example (4). The experimenter is about to take a particular hat on the floor for her own use. To dissuade her from her intended action, David shakes his head from side-to-side and then points to the hat.

(4) headshake
point to hat
Don't take that hat. (3;03, #652)

3.2 Denials

A second form of negation found in David's sentences is *denial*. A gesture sentence is coded as a denial when the sentence asserts that an actual or supposed proposition is not the case. Denials are comments on the truth or falsity of a proposition and do not require that the to-be-denied proposition be explicitly stated. Unlike rejections, which require the presence of objects or the suggestion/offer of an action, denials can negate elements that are only symbolically present in the prior communications. One could, for example, state that *a robin is not a duck* without anyone explicitly stating the first proposition, that *a robin is a duck*.[3]

As an example, while playing with a toy house and the box that it came in, David recognizes that the toy in his hand is not the same one as depicted in the picture; he looks at the toy in hand; turns to the box, and points to a similar (but not identical) item while shaking his head to indicate that the item is not the toy in the picture.

(5) _____headshake
point to toy picture
This isn't the same toy. (David 3;7, #167)

As another example of David denying the similarity between two objects, while playing with people in a playhouse, David points to each one to indicate that they are not the same (example 6).

(6) ____headshake
point to person 1 – point to person 2 – point to person 3
This person is not the same as those two. (David 3;7, #374)

3. Denials are assertions that contradict a previous proposition and could, in principle, include denials of the existence of an objection, e.g. 'there are no such things as unicorns' (denying the assertion that unicorns exist). There is thus a complex relation between statements about the nonexistence of an entity, which we coded only when the entity was expected to be present (i.e. it is a surprise that it is not there), and denials of assertions about the existence of an entity.

In addition to denying similarities, David also uses his gestures to deny states. In example (7), David begins a discussion of belts by making a gesture at his waist for BELT (he clasps his hands together at his waist as if fastening a belt) and then pointing to the location on his pants where a belt would sit. David then goes around the room asking if each person has a belt. The experimenter then asks David if he has a belt, and he replies:

(7) side-to-side headshake – PULL UP (act of pulling on imaginary pants)
I don't have a way to hold up my pants. (3;10, #383)

3.3 Nonoccurrence/nonexistence

The third type of negative meaning found in David's sentences is *nonoccurrence* of actions and *nonexistence* of entities. Nonoccurrence statements are comments about an action that did not occur in a context where it was expected to occur. Common triggers of nonoccurrence include situations where toys fail to perform their expected actions. When playing with a Mickey Mouse wind up toy, the experimenter winds the toy up and places it in front of David. When it doesn't move, David remarks that it didn't walk. The flip gesture (rotating the palm from facing down to facing up) is used here as an exclamatory marker conveying surprise (see Franklin et al. 2010, for discussion of how this gesture is used in home sign).

(8) _____headshake
flip – point to Mickey Mouse toy – flip
It didn't move! (David 3;10, #358)

In a similar interaction with a toy cash register, the drawer fails to open when David presses the key. His statement about the non-action follows.

(9) flip – tap cash register
It didn't open! (David 2;10, #50)

Nonexistence statements are comments about the absence of an object whose presence is expected in that context. Negation in the form of nonexistence often occurred when David was playing with a toy that was missing a part. It is through experience with the toys and with objects in the world that David develops expectations about the toys and objects. For example, when David notices that the experimenter is not wearing the watch she typically wears, his point to her wrist, produced along with a side-to-side headshake and a flip gesture, signals that he has noticed the absence of the watch. Coding nonexistence is facilitated by the fact that we are familiar with the toys and objects in David's environment.

3.4 A developmental look at negation in home sign

Bloom (1970) found that hearing children learning English initially expressed nonexistence and rejection in their negative sentences and only later expressed denial (see also Hummer, Wimmer & Antes 1993; Pea 1980). To determine whether David displayed a similar development pattern, we examined how often David expressed the three types of negative meanings during his first four sessions (ages 2;10 to 3;03) and during the later four sessions (ages 3;05 to 3;10). Table 1 presents the proportion of negative meanings expressing rejection, nonexistence/nonoccurrence, and denial that David produced during his early and late sessions. Rejection is the predominant type of negative sentence across both periods: 48% of the negative sentences David produced during his early sessions and 66% of those produced during his later sessions were rejections of objects and actions. In contrast, nonexistence and nonoccurrence was prevalent during the early sessions (48%) but not during the later sessions (10%). Denial showed the opposite pattern – it was rarely produced during the early sessions (4%) and increased in frequency in the later sessions (23%).

Table 1. The three types of negative meanings David expressed as a proportion of the total number of negative sentences he produced during his early (2;10–3;03) and later (3;05–3;10) observation sessions

	Early Observation Sessions (n = 179)	**Late Observation Sessions (n = 148)**
Rejection	.48	.66
Nonexistence Nonoccurrence	.48	.10
Denial	.04	.24

David thus exhibited the same developmental pattern with respect to negation as hearing children learning English from their hearing parents (Bloom 1970).

4. The syntax and function of negation in David's home sign

4.1 A gestural marker for negation

Having described the types of negative meanings David expresses, we now ask whether he uses a consistent gestural form to express them. In English, sentences are considered negative if they are produced with negative intent *and* include negative words such as *no, not*, *don't* or *no more*. Although David was not exposed to a conventional sign language, he did see the gestures that his hearing parents routinely produced, including

side-to-side headshakes that convey negative meaning in American culture. Like other young children that shake their heads to indicate negation before they express negative meanings in speech (Pea 1980; Volterra & Antinucci 1979), David also uses this form. In fact, we found that 276 of the 327 negative sentences David produced (84%) included a side-to-side headshake.[4] The remaining negatives are expressed using other markers, such as a manual flip or a shrug of the shoulders; in rare instances, negatives are expressed pragmatically without any formal marking at all.

Are side-to-side headshakes used to convey other meanings besides negative meanings? We isolated all of the side-to-side headshakes that David produced and determined the meanings that they conveyed. We found that 92% (276/301) of the headshakes that David produced were used to convey negation. The headshakes that were not used to convey negation were found primarily in sentences where David was expressing a negative attitude: a disbelief or disapproval. These expressions of disapproval occur, for example, when David scolds the experimenter for teasing him. When she refuses to play appropriately with a toy (i.e. not placing the coin in the slot but laying it down on top), David shakes his head with slow deliberation to chastise her actions. Other examples include similar scenarios in which David uses a headshake to convey his disbelief at continued teasing or his disapproval of others' use of the toys.

4.2 The position of the side-to-side headshake in David's multi-gesture sentences

Roughly half of David's side-to-side headshakes that conveyed negative meanings were produced in sentences containing only the headshake (N = 158).[5] Another 35 headshakes were produced simultaneously with all of the gestures they accompanied (e.g. a side-to-side headshake produced along with a series of points). The remaining 83 headshakes were produced in multi-gesture sentences and did not overlap with all of the gestures in the sentence. These sentences thus allow us to determine whether David produced his negative marker in a consistent sentential position. David produced 79% of his headshakes in multi-gesture sentences at the beginning of the sentence (63 vs. 20, χ^2 (1) = 21.5 $p < .001$), with the remaining 21% occurring at the end of the sentence (9 of the 20 headshakes at the ends of sentences conveyed nonexistence

4. 56 of the 276 negative expressions involving a headshake also include a flip of the wrist. These flip + side-to-side headshake combinations were largely used to express non-existence and non-occurrence (n = 45). We argue in Franklin et al. (2010) that the inclusion of the flip indicates David's surprise in such expressions.

5. This number includes headshakes that were combined with flips but with no other gestures. Excluding flip + side-to-side headshake combinations, the number of headshakes alone is 124.

or nonoccurrence and were produced along with a flip gesture; for a discussion of the use of flips see Franklin et al., 2010). Note that headshakes do not occur in the middle of sentences in David's system. In other words, negation does not take "intermediate" scope within the proposition in David's gesture system.

4.3 Left periphery of the sentence and the position of negation

We have found that side-to-side headshakes crystallize early as the expression of logical negation in David's home sign system, and that this meaning has a fixed position at the beginning of the sentence.

In logical syntax, sentential modifiers appear in the periphery of the sentence, hence negation is represented as ¬ φ. In natural languages, sentential negative markers tend to appear in the periphery too: either at the periphery of the sentence (sentence initial position), or at the periphery of the verb – preceding the tensed verb (as in Romance languages, Greek and Slavic languages, Example 10), or following it (as in German, Dutch, Example 11; see Horn 1989 and Zanuttini 1991, 1997, for extensive discussions of placement of various sentential negation markers). The sentence peripheral negator and the verb peripheral negator are underlined in the examples below; the tensed verb is in italics.

(10) Non, no ha *visto* Maria. (Italian)
Oxi, dhen *idha* ti Maria. (Greek)
No, not saw.3SG the Mary
No, I didn't see Mary.

(11) Nein, Johan *isst* nicht. (German)
Nee, Jan *eet* niet. (Dutch)
No, John eat.pres.3SG *not*
No, John doesn't eat.

We see here that there is a lexical distinction between sentence peripheral and verb peripheral sentential negations. The sentence initial negation – also known as *external* negation – is typically thought of as *anaphoric* denial and serves as a link between the current negative sentence (containing the negation peripheral to the tensed verb) to the previous discourse. The verb peripheral negation – also known as *internal* negation – is placed to the right or the left of the verb (English combines the tensed auxiliary with negation – *doesn't* – and this form appears to the left of the verb). If the VP is the minimal propositional domain, as is commonly assumed in linguistics, then placement of negation to the right or left of the verb is consistent with the fact that the negative marker takes the proposition as its argument. The additional (optional) use of external negation situates the locus of logical application of negation at the beginning of the string while also linking it to the previous utterance.

Sign languages exhibit similar patterns. Despite the fact that they display rich typological variation in the exact signs used for negation (i.e. manual or non-manual dominant systems), signed languages, like spoken languages, tend to place negators in the sentence-final or postverbal position (Zeshan 2004, 2006; Pfau & Quer 2002). Manual negators (or negative signs) tend to be placed pre-verbally, and some are clause final.[6]

The syntactic fact that negation is placed on the periphery is consistent with the logical syntax of sentential negation, and David's placement of the side-to-side headshake at the beginning of the sentence *mirrors* the position of negation in the logical syntax. We can therefore view his side-to-side marker as the sentence initial *no, nein, oxi, nee* negative element that marks the locus of application of logical negation. Interestingly, this is the form of negation that also appears at the earliest stages of language acquisition, a fact consistent with David's age and development.

In concluding this analysis, we will speculate here about the roots of sentence-initial negation in David's home sign system (for more discussion see Franklin et al., 2010.). In Section 3.4, we noted that rejection was the dominant function of the side-to-side headshake in David's early sessions. When David first combined the side-to-side headshake with a manual pointing gesture to express rejection, he used the headshake to reject not the object to which he pointed, but another object that had previously been mentioned. In other words, he used the headshake anaphorically to negate the previous utterance, not to negate the utterance to which it was attached (Franklin & Goldin-Meadow 2008). Since the side-to-side headshake negates the previous utterance, it makes sense for it to be positioned as close to that utterance as possible (i.e. at the beginning of the utterance to which it is attached). Having produced the headshake in sentence-initial position for rejections, David may then have continued to use the position when he began to produce (non-anaphoric) truth functional denials.

It is interesting to note that children learning spoken languages also situate their negative markers in sentence-initial position at the earliest stages of language learning (Bellugi 1967). Moreover, Bloom (1970) claims that most sentence-initial negations in the data she collected were actually anaphoric to the previous utterance, and Drozd (1995) argues that pre-subject negations in English-learning children are instances of anaphoric "metalinguistic exclamatory negation," equivalent to 'no way' or 'don't say'.

The external negations in (10) and (11) have this anaphoric metalinguistic function. The distinction made in the literature is between "regular" sentential negation and pragmatic denial, which is anaphoric and corrective in that it functions

6. It must also be noted that there is no universal pattern in sign for negation placement on the boundary (e.g. Hong Kong Sign allows for a medial position headshake).

to object to the information introduced in a previous utterance. Pragmatic denial can be thought of as metalinguistic negation (Horn 1989); in some languages, the negation marker used in the peripheral position may also be used to convey metalinguistic negation meaning. Greek *oxi* is one such case (Giannakidou 1998):

(12) A: O Petros exi tria pedia.
Peter has three children.

B: **Oxi**! O Petros exi **oxi** tria pedia, ala tessera!
No, Peter doesn't have three children but four.

Languages typically distinguish between the elements used in regular sentential negation and those used in metalinguistic denial (see Drozd 1995). The fact that David's home sign does not (or does not yet) make this distinction makes it plausible to hypothesize that David's rejection negation was initially an anaphoric negation that has developed, and perhaps is continuing to develop, into internal negation use.[7]

5. Conclusions

In this paper we show how a young home signer, who has not been exposed to usable input from a conventional language, can take a commonly used gesture – the side-to-side headshake – and incorporate it into his gestures to convey the set of negative meanings typically conveyed by children who are learning language from a conventional model. Importantly, we also find that the side-to-side headshake occupies a consistent position in the home signer's gesture sentences – at the beginning of the sentence, a position where many natural languages, spoken or signed, place negative markers. The side-to-side headshake thus displays systematic and consistent meaning, use, and syntactic position in the deaf child's home signs and, in this sense, can be analyzed as a *syntactic* expression of negation. As such, the side-to-side gesture functions as a structure building operator; that is, it creates a more complex sentence out of a simpler one. Our arguments draw from the standard assumptions about the meaning of negation employed in current linguistic theorizing, and capitalize on

7. Note that David does not produce his negative headshake with a negative manual gesture, as is found in many sign languages. Anderson and Reilly (1997) document that deaf children acquiring ASL from their deaf parents go through a three-step developmental progression in the expression of negation: (1) headshake only, (2) manual negation only, (3) coarticulation of headshake and manual negation. David has not yet moved (and may not move) beyond the headshake stage.

striking parallels between the side-to-side headshake and the way negation is organized in natural languages and the way it develops in child language. Our analysis implies that home signs have at least the minimal syntax of negation. If so, then our data serve as further evidence for the position that what we see in home sign is a language creation process (Goldin-Meadow 2003).

References

Anderson, Diane S. & Reilly, Judy S. 1997. The puzzle of negation: How children move from communicative to grammatical negation in ASL. *Applied Psycholinguistics* 18: 411–429.

Bellugi, Ursula. 1967. The Acquisition of Negation. Ph.D. dissertation, Harvard University.

Bernini, Giuliano & Ramat, Paolo. 1996. *Negative Sentences in the Languages of Europe: A Typological Approach*. Berlin: Mouton de Gruyter.

Bloom, Lois. 1970. *Language Development: Form and Function in Emerging Grammars* [Research monograph 59]. Cambridge MA: The MIT Press.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge MA: The MIT Press.

Chomsky, Noam, Hauser, Mark & Fitch, Tecumseh. 2002. The faculty of language: What is it, who has it, and how did it evolve? *Science* 298 (5598): 1569–1579.

Conrad, Richard. 1979. *The Deaf Schoolchild: Language and Cognitive Function*. London: Harper & Row.

Drozd, Kenneth. 1995. Child English pre-sentential negation as metalinguistic exclamatory negation. *Journal of Child Language* 22: 583–610.

Ellenberger, Ruth, Moores, Donald & Hoffmeister, Robert. 1975. Early stages in the acquisition of negation by a deaf child of deaf parents. Research Report 94, University of Minnesota.

Feldman, Heidi, Goldin-Meadow, Susan & Gleitman, Lila. 1978. Beyond Herodotus: The creation of language by linguistically deprived deaf children. In *Action, Symbol, and Gesture: The Emergence of Language*, Andrew Lock (ed.), 351–414. New York NY: Academic Press.

Fischer, Susan. 2006. Questions and negation in American Sign Language. In *Interrogative and Negative Constructions in Sign Languages*, Ulrike Zeshan (ed.), 165–197. Nijmegen: Ishara Press.

Franklin, Amy, Giannakidou, Anastasia & Goldin-Meadow, Susan. 2011. Negation, questions, and structure building in a home sign system. To appear in *Cognition*.

Franklin, Amy, Giannakidou, Anastasia & Goldin-Meadow, Susan. 2008. (Non) veridicality in home sign. Paper presented at Linguistic Society of America.

Franklin, Amy & Goldin-Meadow, Susan. 2008. Negation in home sign systems. Paper presented at International Association for the Study of Child Language. Edinburgh, July 2008.

Giannakidou, Anastasia. 1998. *Polarity Sensitivity as (Non)veridical Dependency* [Linguistik Aktuell/Linguistics Today 23]. Amsterdam: John Benjamins.

Giannakidou, Anastasia. 1999. Affective dependencies. *Linguistics and Philosophy* 22: 367–421.

Goldin-Meadow, Susan. 2003. *The Resilience of Language: What Gesture Creation in Deaf Children can tell us about Language-learning in General.* New York NY: Psychology Press.

Goldin-Meadow, Susan & Mylander, Carolyn. 1984. Gestural communication in deaf children: Non-effect of parental input on language development. *Science* 221(4608): 372–374.

Goldin-Meadow, Susan & Mylander, Carolyn. 1998. Spontaneous sign systems created by deaf children in two cultures. *Nature* 91: 279–281.

Goldin-Meadow, Susan, Mylander, Carolyn & Butcher, Cynthia. 1995. The resilience of combinatorial structure at the word level: Morphology in self-styled gesture systems. *Cognition* 56: 195–262.

Goldin-Meadow, Susan, Mylander, Carolyn & Franklin, Amy. 2007. How children make language out of gesture: Morphological structure in gesture systems developed by American and Chinese deaf children. *Cognitive Psychology* 55: 87–135.

Hoffmeister, Robert & Wilbur, Ronnie. 1980. Developmental: The acquisition of sign language. In *Recent Perspectives on American Sign Language*, Harlan Lane & François Grosjean (eds), 61–78. Hillsdale NJ: Lawrence Erlbaum Associates.

Horn, Laurence. 1989. *A Natural History of Negation*. Chicago IL: University of Chicago Press.

Hummer, Peter, Wimmer, Heinz & Antes, Gertraud. 1993. On the origins of denial negation. *Journal of Child Language* 20(3): 607–18.

Kegl, Judy, Senghas, Ann & Coppola, Marie. 1999. Creation through contact: Sign language emergence and sign language change in Nicaragua. In *Language Creation and Language Change: Crealization, Diachrony, and Development*, Michel DeGraff (ed.), 179–237. Cambridge MA: The MIT Press.

Lillo-Martin, Diane. 1999. Modality effects and modularity in language acquisition: The acquisition of American Sign Language. In *Handbook of Child Language Acquisition,* William Ritchie & Tej Bhatia (eds), 531–567. New York NY: Academic Press.

Mayberry, Rachel. 1992. The cognitive development of deaf children: Recent insights. In *Child Neuropsychology,* Vol. 7, *Handbook of Neuropsychology*, Sid Segalowitz & Isabelle Rapin (eds), 51–68. Amsterdam: Elsevier.

McNeill, David & McNeill, Nobuko. 1968. What does a child mean when he says 'no'? In *Proceedings of the Conference on Language and Language Behavior,* Eric Zale (ed.), 51–62. New York NY: Appleton-Century.

Meadow, Katheryn. 1968. Early manual communication in relation to the deaf child's intellectual, social, and communicative functioning. *American Annals of the Deaf* 113: 29–41.

Nevins, Andrew, Pesetsky, David & Rodrigues, Cilene. 2009. Pirahã exceptionality: A reassessment. *Language* 85(2): 355–404.

Newport, Elissa & Meier, Richard. 1985. The acquisition of American Sign Language. In *The Cross-linguistic Study of Language Acquisition,* Vol. 1: *The data,* Dan Slobin (ed.), 881–938. Hillsdale NJ: Lawrence Erlbaum Associates.

Pea, Roy D. 1980. The development of negation in early child language. In *The Social Foundations of Language and Thought: Essays in Honor of Jerome S. Bruner*, David R. Olson (ed.), 156–186. New York NY: W.W. Norton.

Pfau, Roland & Quer, Josep. 2002. V-to-Neg raising and negative concord in three sign languages. *Rivista di Grammatica Generativa* 27: 73–86.

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

Sadock, Jerrold. 1991. *Autolexical Syntax: A Theory of Parallel Grammatical Representations*. Chicago IL: University of Chicago Press.

Sandler, Wendy, Meir, Irit, Padden, Carol & Aronoff, Mark. 2005. The emergence of grammar: Systematic structure in a new language. *PEAS* 102: 2661–2665.

Searle, John. 1969. *Speech Acts: An Essay in the Philosophy of Language.* Cambridge: CUP.

Volterra, Virginia & Antinucci, Francesco. 1979. Negation in child language: A pragmatic study. In *Developmental Pragmatics*, Elinor Ochs & Bambi Schieffelin (eds), 281–303. New York NY: Academic Press.

Zanuttini, Raffaella. 1991. Syntactic Properties of Sentential Negation: A Comparative Study of Romance Languages, Ph.D. Dissertation, University of Pennsylvania.

Zanuttini, Raffaella. 1997. *Negation and Clausal Structure*. Oxford: OUP.

Zeshan, Ulrike. 2004. Hand, head and face: Negative constructions in sign languages. *Linguistic Typology* 8(1): 1–58.

Zeshan, Ulrike. 2006. *Interrogative and Negative Constructions in Sign Languages*. Nijmegen: Ishara Press.

Zwarts, Frans. 1995. Three types of polarity. In *Plurality and Quantification*, Fritz Hamm & Erhard Hinrichs (eds), 177–238. Dordrecht: Kluwer.