

The Development of Nicaraguan Sign Language via the Language Acquisition Process

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1. Introduction

One of the central goals in research on language acquisition is to discover what knowledge and abilities children bring to the learning situation. Never before in the history of language research has there been a better opportunity to ask this question as the current situation in Nicaragua, where young children deprived of exposure to any language are inventing a new one.

Only sixteen years ago, public schools for deaf children were first established in Nicaragua. Despite the fact that these schools advocated an oral, rather than signing, approach to education, they served as a magnet for a new community of deaf children who had not previously had contact with one another. Consequently, these children created their own indigenous sign language. The language is not a simple code or gesture system; it has already evolved into a full, natural language. It is independent from Spanish, the spoken language of the region, and is unrelated to American Sign Language (ASL), the sign language used in most of North America.

The present study examines how this first generation of signers is imposing grammatical structure on their sign language as it develops. The method which guides this work is one that is central to language acquisition research: by examining the structure evident in the children's sign language production, and subtracting from that the portion present in the language to which the children were originally exposed, one can discover the children's contribution.

2. The development of Nicaraguan Sign Language

Kegl & Iwata (1989) described some of the earliest stages of Nicaraguan signing, comparing it to ASL and evaluating its status as a creole. So far, two distinct forms of the sign language have emerged. The oldest members of the community, who are now in their mid- to late-twenties, entered the schools in 1978, each with a different, highly idiosyncratic homesign or gesture system. Upon contact they developed a now partially-crystallized pidgin called Lenguaje de Signos Nicaragüense (LSN) which they continue to use today. Younger deaf children (many as young as four years old) who entered the deaf community since that time were exposed to the pidgin LSN used by the older children. From this impoverished language input they produced something richer: the new creole Idioma de Signos Nicaragüense (ISN). ISN is a full-fledged, primary sign language, resulting from the process of *nativization*, or *abrupt creolization* as Bickerton (1984) defines it.

An initial set of acquisition studies has revealed several specific grammatical structures that the younger children have developed, including an inflectional verb morphology system and a noun classifier system. These constructions were

found primarily in the signing of the younger ISN signers, and were much less common in the signing of the older LSN signers (Senghas et al., 1994; Senghas, 1994).

3. Age at Entry and Year of Entry

The present study attempts to tease apart the potential sources of these morphological changes. In particular, it examines the degree of grammatical complexity with respect to two different factors which are predicted to combine to account for the differences we have noted between older and younger signers. The first is a child's age at the time of entry into the signing community, or Age at Entry. Children who are exposed to a language at a younger age ultimately achieve greater fluency in the language than those who are exposed only later in life. This point is clear from common observation, and has been shown experimentally (Newport, 1990). Because the ages at which deaf Nicaraguans acquired sign language range from birth to very late adolescence, one can compare their command of certain constructions to pinpoint the ages at which the constructions can be mastered. The effect of Age at Entry likely accounts for a portion of the observed differences between LSN and ISN signers, since late-exposed signers are more apt to be in the older LSN group.

A second factor which may account for differences in grammatical complexity is a child's Year of Entry into the signing community, that is, whether the child began learning the sign language at an earlier or later point in time, such as 1981 vs. 1990. If the language is indeed becoming richer over time, signers who entered the community more recently should have been exposed to richer signing than signers who entered the community in its earliest years. More complex signing among children with a later Year of Entry would be evidence that the complexities have appeared in recent years.

4. Current study: narrative elicitation task

4.1. Procedure

The subjects of the present study are 25 deaf Nicaraguan signers whose ages at the time of testing ranged from 7;6 to 31;11, with a mean of 21;1. Their Age at Entry ranges from birth to 27;5, with a mean of 9;10 and their Year of Entry ranges from 1978 to 1990.

Each subject was presented with a 2-minute animated cartoon (*Mr. Koumal Battles his Conscience*, Studio Animovaného Filmu, 1973) and asked to sign the story to a deaf peer. The narratives were videotaped, and the videotapes were then coded with respect to what events were represented, and which morphological devices were used in recounting those events. In particular, we examined certain features of the verb phrase: how many arguments a verb can take, specific inflections that can be incorporated into verbs, and whether those inflections are used to mark agreement with other words in the narrative.

4.1.1. Number of arguments per verb

One measure of grammatical complexity is the *number of arguments per verb*. It is likely that the syntactic structure needed for a verb to support more than one argument has only recently appeared in Nicaraguan signing. Verbs' subjects and/or objects can be articulated in any of three different ways. Some are simply stated as a noun. Some are indicated with an inflectional feature, generally an indicator of spatial agreement, such as a pointing motion following the verb, or a directional orientation of the verb that associates it with a previously established referent. Some are indicated through a means (which may be unique to Nicaraguan signing) of using the stem of another verb which has been previously associated with the intended referent. To produce this form, a verb is truncated to its uninflected stem form and used later in the narrative in a nounlike way to refer to its argument (this construction is described in more detail in Senghas, 1994).

4.1.2. Inflection and agreement

Like many other sign languages, Nicaraguan signing takes advantage of its spatial component to inflect verbs for person or location. A verb can be oriented toward a specific locus to indicate third person, for example, or the body can be shifted toward that locus and the sign produced in the first person. In addition, verbs can be inflected to indicate number, manner, or completion. Verbs can be multiply inflected, simultaneously incorporating two or more inflections. A sign is coded as exhibiting *agreement* when its inflection corresponds to an inflection on a previous word in order to co-index them, or to refer to the same argument. For example, a verb with plural inflection would exhibit agreement with its argument if the argument were also marked for plural. Several verbs would be coded as exhibiting agreement if they were similarly inflected, that is, oriented toward the same locus, in order to indicate that they share an argument.

If younger children are indeed contributing to the complexity of Nicaraguan signing, we should find that signers with a lower Age at Entry and signers with a later Year of Entry show more arguments per verb than signers who were older and signers who were exposed to an earlier form of the language. They should also use more inflectional marking, and more of their inflected forms should exhibit agreement across the discourse.

4.2. Results

For all analyses, subjects were grouped by Age at Entry and Year of Entry. They fell into three groups with respect to Age at Entry: *young* (0;0-6;6, n=8), *medium* (6;7-10;0, n=8), and *old* (10;1-27;5, n=9). They fell into two groups with respect to Year of Entry: *before 1983* (n=13) and *1983 or later* (n=12).

4.2.1. Verbs with two or more arguments

The first analysis uses the number of arguments associated with a verb as its measure of grammatical complexity. The proportion of verb phrases which indicated two or more arguments was computed for each narrative. This proportion was examined with respect to the Age at Entry and the Year of Entry of each signer. The results of this comparison are presented in Figure 1.

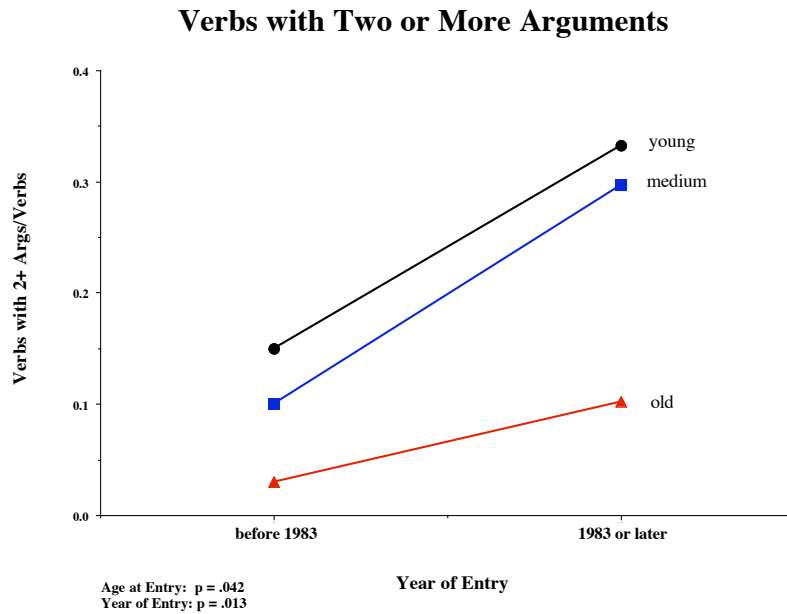


Figure 1. The proportion of verbs which support at least two arguments is greater for signers who entered the community in 1983 or later, and for signers who were first exposed to the language at a *young* age.

An Age at Entry (3) by Year of Entry (2) analysis of variance (ANOVA) was conducted on the proportion of verbs with two or more arguments. This analysis revealed a main effect for Year of Entry, $F(1, 19)=7.49$, $p=.013$. Subjects who entered the signing community in 1983 or later use verbs with two or more arguments more than twice as often ($X=.21$) as subjects who entered the community before 1983 ($X=.10$). This effect is evident in Figure 1 as the positive slope of the lines corresponding to all three age groups.

The analysis also revealed a main effect for Age at Entry, $F(2, 19)=3.77$, $p=.042$. Pairwise comparisons revealed that the subjects who began signing at a *young* age used verbs with two or more arguments more than twice as often

($X=.22$) than subjects who began signing at an *old* age ($X=.08$), $F(1,13)=5.33$, $p=.04$. There was no difference detected between the *young* and *medium* ($X=.17$) or the *medium* and *old* groups in the proportion of verb phrases with at least two arguments. The effect of Age at Entry is evident in Figure 1 as the gap between the lines corresponding to each age group.

4.2.2. Inflections per verb

The second analysis uses the number of inflections per verb as its measure of grammatical complexity. Inflections included number inflection, person inflection, position or orientation inflection, and aspectual markers. The mean number of inflections per verb was computed for each narrative. This proportion was examined with respect to the Age at Entry and the Year of Entry of each signer. The results of this comparison are presented in Figure 2.

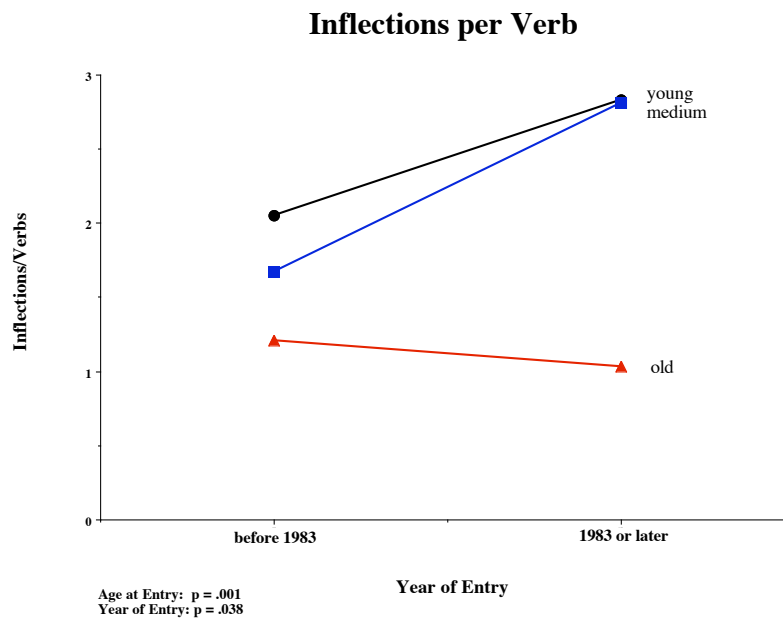


Figure 2. The number of inflections per verb is greater overall for signers who entered the community in 1983 or later, and for signers who were exposed to the language at a *young* or *medium* age. The *young* and *medium* Age at Entry signers are particularly affected by a later Year of Entry.

An Age at Entry (3) by Year of Entry (2) analysis of variance (ANOVA) was conducted on the number of inflections per verb. This analysis revealed a

main effect for Year of Entry, $F(1, 19)=4.99$, $p=.038$. Subjects who entered the signing community in 1983 or later use more inflections per verb ($X=1.93$) than subjects who entered the community before 1983 ($X=1.71$). This effect is evident in Figure 2 as the positive slope of the lines, particularly of the *young* and *medium* Age at Entry groups.

The analysis also revealed a main effect for Age at Entry, $F(2, 19)=10.26$, $p=.001$. Pairwise comparisons revealed that the subjects who began signing at a *young* age used more than twice as many inflections per verb ($X=2.34$) as subjects who began signing at an *old* age ($X=1.09$), $F(1,13)=18.19$, $p=.0009$. Subjects who began signing at a *medium* age used nearly twice as many inflections per verb ($X=2.10$) as subjects who began signing at an *old* age ($X=1.09$), $F(1,13)=11.40$, $p=.005$. There was no difference detected between the *young* and *medium* groups in the number of inflections per verb. The effect of Age at Entry is evident in Figure 2 as the gap between the lines corresponding to each age group.

Although there was no interaction detected between the Age at Entry and Year of Entry factors, the effect of Year of Entry is present in only the *young* and *medium* Age at Entry groups.

4.2.3. Agreement per verb

The third analysis uses the number of inflections exhibiting agreement as its measure of grammatical complexity. Of the inflections coded in the second analysis, those exhibiting agreement with another sign in the narrative were tabulated. The mean number of inflections showing agreement per verb was computed for each narrative. This proportion was examined with respect to the Age at Entry and the Year of Entry of each signer. The results of this comparison are presented in Figure 3.

An Age at Entry (3) by Year of Entry (2) analysis of variance (ANOVA) was conducted on the number of inflections showing agreement per verb. This analysis revealed a main effect for Year of Entry, $F(1, 19)=8.17$, $p=.003$. Subjects who entered the signing community in 1983 or later use more agreement per verb ($X=.94$) than subjects who entered the community before 1983 ($X=.66$). This effect is evident in Figure 3 as the positive slope of the lines, particularly of those corresponding to the *young* and *medium* Age at Entry groups.

The analysis also revealed a main effect for Age at Entry, $F(2, 19)=9.07$, $p=.007$. Pairwise comparisons revealed that the subjects who began signing at a *young* age used more than twice as many inflections showing agreement per verb ($X=1.03$) as subjects who began signing at an *old* age ($X=.43$), $F(1,13)=12.54$, $p=.004$. Subjects who began signing at a *medium* age also used more than twice as many inflections showing agreement per verb ($X=.98$) as subjects who began signing at an *old* age ($X=.43$), $F(1,13)=10.69$, $p=.006$. There was no difference detected between the *young* and *medium* groups in the number of inflections showing agreement per verb. The effect of Age at Entry is evident in Figure 3 as the gap between the lines corresponding to each age group.

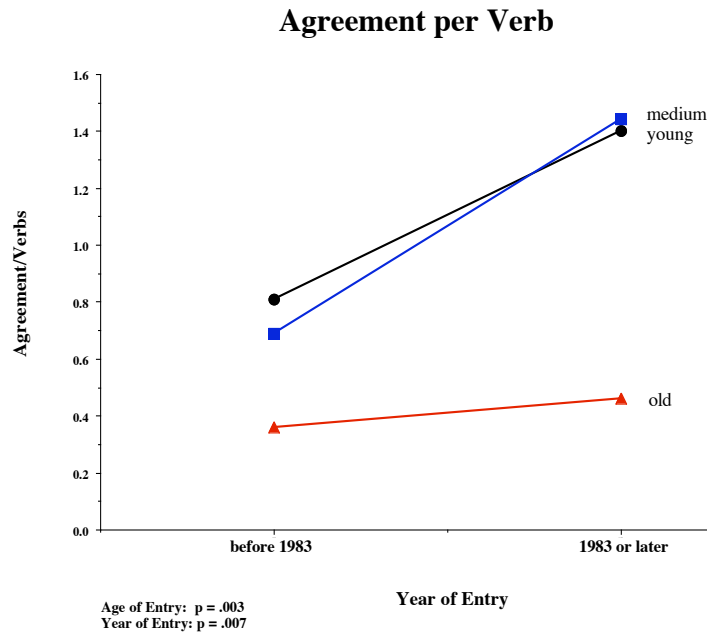


Figure 3. The number of inflections showing agreement per verb is greater overall for signers who entered the community in 1983 or later, and for signers who were exposed to the language at a *young* or *medium* age. The *young* and *medium* Age at Entry signers are particularly affected by a later Year of Entry.

Although there was no interaction detected between the Age at Entry and Year of Entry factors, the effect of Year of Entry is present in only the *young* and *medium* Age at Entry groups.

4.3. Discussion

As predicted, the age at which signers are first exposed to a sign language has a strong effect on their ability to command some of its more complex structures. Signers who were exposed to Nicaraguan signing at a young age can indicate more arguments with their verbs than signers who were exposed to the language only after they were older. The younger learners will also use the inflectional verb system more, and are more likely to use it to indicate grammatical agreement. This finding is consistent with theories that claim that children's language-learning abilities decrease with age. Upon closer

examination we should be able to discover if certain forms are more available at different periods of a child's development.

The calendar year in which signers entered into the Nicaraguan signing community also strongly affects their command of these same grammatical structures. Those who have entered the community in more recent years actually include more of the complex constructions in their signing than those who began signing longer ago, despite the fact that the more recent learners have had fewer years of exposure to the language. This evidence strongly suggests that the language has become measurably richer over the last sixteen years as the new generation of deaf children has acquired it.

The combination of the two factors of Age at Entry and Year of Entry has created an unusual situation in which the most proficient signers in the community are its youngest and newest members.

Although no statistical interaction between the two factors was detected, it is likely such an interaction will become evident as more narratives are analyzed, since the effect of Year of Entry is present only in the signers who entered the community under the age of ten. It may be that older signers are unable to take advantage of the increased richness of the language that surrounds them; or perhaps only the younger children enrich the language as they learn it. When new constructions are added to the language, children young enough to learn or create them will have those constructions at their disposal.

4.4. Reanalysis or imperfect learning?

It is interesting to look at particular constructions in the grammar that seem to have undergone a change to try to determine how change in the language occurs. A closer examination of position or location inflection, for example, reveals that while signers who began signing in 1980 are using these inflectional markers, only those who began signing a few years later (and at a young age) use these inflections to mark agreement.

Similarly, one sign used by many of the older signers incorporates a shoulder shift with a simultaneous wrist rotation to indicate a change in person from the previous verb. Younger, more recent signers use a slightly modified version of this sign, using a shift toward a particular locus consistently throughout the discourse to refer to (and hence, express agreement with) a repeated argument.

There are two possible ways of interpreting this difference between older and younger signers:

- The older signers may have developed the inflectional marker for change of person early, and used it for several years before younger signers reanalyzed the construction as a way to mark agreement.
- The younger signers may have introduced a system of inflection and agreement in one piece in 1983, using person and location inflection to mark agreement. Older signers, now turning to the younger, more proficient signers as their

models, may have learned this system imperfectly, using the inflection to mark a change of person, but not consistently marking agreement across the discourse.

This question might be resolved by finding examples of this construction or its precursors in videos taken during earlier years. This would be clear evidence of how the current construction evolved. The question might also be resolved by locating signers who were members of the signing community during the early years but have had little contact with younger deaf children since that time. If these signers use the inflection, but not as a marker of agreement, it would be likely that the inflection was reanalyzed by the younger children as an agreement marker.

5. Conclusion

By using this type of questioning, we can map out when the sign language in Nicaragua took on different structures, and how specific constructions are being reanalyzed by children as they learn them. It is clear that these young children are not merely using a language more proficiently than their models--they are enriching their language as they learn it.

Following the growth of this new language gives us an unprecedented opportunity to examine the forces that drive both language learning and language change. All children have a special inborn ability not only to learn language, but to surpass the language of the environment when it is weak, and to create a language where none existed.

Notes

- * grateful thanks to Marie Coppola, Richard J. Senghas, Judy Kegl, Noel Lam (MED), APRIAS, Steven Pinker, Hoyt Bleakley, Rebecca Kaplan, Malia Crawford, Emily Wallis, and the children at Melania Morales, Managua, Nicaragua. This research was supported by training grant #T32 MH18823 from the National Institutes of Mental Health to the Department of Brain and Cognitive Sciences at MIT, and from a Spencer Foundation Dissertation Fellowship to the author.

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