Methods

Participants. 40 Nicaraguans participated in the present study: 10 Spanish-speakers with normal hearing, and 30 deaf signers of Nicaraguan Sign Language (NSL). Hearing participants had never been exposed to NSL. Deaf participants were divided into cohorts based on the year that they were first exposed to NSL: first cohort (prior to 1984); second cohort (1984-1993); and third cohort (after 1993). Participants' age at testing ranged from 10 to 30 years, with the following means: hearing participants, 23 years; first cohort, 26 years; second cohort, 16 years; third cohort, 11.5 years. The means and ranges of the deaf participants' ages at the time they were first exposed to NSL are given in table S1. Most participants were first exposed when they entered the school for special education at the preschool or first grade level. Two participants were exposed from birth, each having an older deaf member in the same household attending the school. The age of exposure was recorded as 0;0 for these participants.

Table S1: Means and ranges of deaf participants' ages at the time they were first exposed to NSL, separated out by cohort.

Group	N	Mean of ages at exposure: (years; months)	Range of ages at exposure: (years; months)
First cohort	10	3;10	0;0 to 5;7
Second cohort	10	3;9	0;0 to 6;2
Third cohort	10	4;6	3;1 to 5;9

Procedure. Participants watched an animated cartoon, approximately 6 min. in duration, on a Sony GV-D900 Walkman portable VCR monitor and narrated its story to a peer. Hearing subjects spoke Spanish, and only their co-speech gestures were analyzed. Deaf subjects signed the narratives to a member of their own cohort. Narratives were videotaped for later analysis.

Coding and analysis. Three complex motion events that involve a salient manner and path of movement were selected from the stimulus cartoon. These depicted: a) a cat climbing up the outside of a gutter drainpipe of a tall building; b) a cat crawling up inside the drainpipe; and c) a cat who, having swallowed a bowling ball, descends a steep street in a rolling, wobbling manner. Participants' descriptions of these three events were located in their narratives. The string of gestures or signs used to describe a motion event were defined as an expression. 130 such expressions were identified; they included a total of 361 gestures and signs.

We were particularly interested in expressions that included information about both the manner and path of movement, as these provided opportunities to apply segmenting and sequencing processes. Five of the Spanish-speakers, and two of the first-cohort signers, never produced such expressions. The remaining 33 participants produced a total of 70 expressions that included both manner and path information, consisting of a total of 241 gestures and signs. Broken down by group, the mean number of expressions that included both manner and path information per participant are as follows: gesturers, 1.8; first cohort, 2.2; second cohort, 2.1; third cohort, 2.3. As the pattern of responses was similar across events, data from the three events were pooled for all analyses.

Spanish narratives were transcribed by a native Spanish-speaker. Gestures that accompanied speech describing the selected motion events, and signed expressions describing the selected motion events, were coded with respect to a) whether they included manner and/or path information, and, b) if both, whether the information was integrated simultaneously and/or sequentially. One of the authors (A.S.), together with a research assistant, coded the full set of data. To obtain reliability measures, two additional research assistants, one a deaf signer of ASL, together coded a subset consisting of 20% of the data. Reliability on all measures was high, with agreement on manner (100%), path (100%), simultaneity (100%), and sequentiality (100%).