Linguistic forms reduce in more predictable-less informative contexts

Givenness and predictability lead to the production of reduced linguistic forms. These reduced forms are typically less acoustically prominent, have shorter syllable lengths, and occupy a smaller and more centralized vowel space (e.g., Breen et al. 2010; Watson et al. 2008; Aylett & Turk 2004; Bell et al. 2003).

Given referents are also more likely to be referred to with fewer modifiers, pronominally, or not at all (e.g., Arnold 2010; Nariyama 2004).

Gestures which accompany descriptions of objects in the common ground are less elaborate than those accompanying descriptions of novel objects (Gerwing & Bavelas 2004).

Stimuli

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Fig. 1: Experimental setup

Round 1: Gesture + Speech

Round 2: Gesture

Round 3: Gesture

Round 4: Gesture

Analysis

Gestures tracked using the Microsoft Kinect, which outputs:

- RGB images
- Estimates of the XYZ position of joints (~30 frames per second)

Gestures were segmented by hand and coded for meaning represented.

The size of the articulatory space and degree of movement for each gesture were calculated using the location over time of the wrists, via ChronoSense software (Lenzen 2015, Weibel et al. 2015).

Fewer gestures

Each gesture was coded for the meaning it represented; here, we have operationalized fewer meanings as fewer gestures.

The number of gestures decreased overall across rounds, as did the number of individual meanings associated with each item.

In Round 2, items differed significantly as to how many gestures were used to describe them, but this variation was not present by Round 4.

Reduction in the form of gestures has been difficult to quantify; this methodology allows for measurement of formal reduction in sign languages analogous to articulatory reduction in spoken languages.

Experiment: Communication Game in Gesture

- 10 pairs of participants
- Alternated between the role of “Communicator” and “Guesser”
- Took turns giving and receiving clues about the same set of 32 English nouns repeated over 4 rounds
- Participants switched from giving and receiving clues halfway through each round
- Throughout the course of the experiment, the items were more predictable, salient, and had been recently produced.

Reduction in articulatory space

Volume of articulatory space (m²)

Significant reduction across rounds in:
- distance travelled
- volume of articulatory space
- time spent gesturing

Fig. 2: Number of gestures across three rounds, by group

Of the gestures introduced in Round 2:
- 28% were not used by Round 4
- 56% were repeated across the 3 rounds

Fig. 5: Distalization: movement thills from more proximal to more distal joints; we found this type of reduction (previously described as a phonetic change in sign languages) to be present in our data.