How Big is “BIG”?

Toward a Representation of Incremental Nonmanual Signals in American Sign Language

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Abstract

American Sign Language (ASL) is the language of the Deaf in the United States and most of Canada. It is the primary means of communication for more than 500,000 people (Baker & Cokely, 1980). Like other signed languages, ASL relies on gestural/visual modalities, in contrast to the oral/aural modalities of spoken languages.

ASL is a natural language, having its own unique phonology, morphology, semantics, and syntax (Stokoe, 1960). Each ASL sign can be described in terms of five parameters, which are hand shape, position, orientation, movement, and nonmanual signals.

Nonmanual signals are all aspects of ASL not produced on the hands (Valle & Lucas, 2000). They play a role in all linguistic aspects of American Sign Language, including:

- The phonemic role, in which some nonmanual signals are atomic units of the language
- The morphological role as they combine with other signs to form meaningful utterances
- The lexical role as unique members of the language vocabulary
- The syntactic role as they are necessary to adhere to the rules that govern formation of grammatical sentences
- The prosodic role, and acting as conversational regulators

Facial expressions comprise an important component of ASL’s nonmanual signals (Dively, 2001). These are not ancillary expressions that accompany syntax as in spoken languages, (Takeuchi & Nagao, 1993), but are essential elements of the language.

In a morphological role, a nonmanual signal acts as a modifier of a manual sign. For example, the sign for “coffee cup” becomes “large coffee cup” when accompanied by the nonmanual signal CHA, indicated by rounded lips pushed forward followed by a wide open mouth. As shown in Figure 1, the intensity of the nonmanual signal indicates the magnitude of the sign. Interestingly, ASL linguists make no distinctions between these different versions of CHA, even though each version has a different form and meaning.
Although NMS are an essential part of the language, no previous research effort has addressed the problem of acquiring or storing NMS for use in displaying ASL through computer synthesized animation. Any digital representation must take them into account. It is simply impossible to reproduce certain signs without incorporating NMS.

The challenge that lies ahead is a comprehensive automatic synthesis of facial animations that depict NMS. To synthesize and portray ASL requires a representation system for nonmanual signals capable of specifying any facial pose associated with any nonmanual signal. Additionally, such a system should allow both binary and incremental nonmanual signals to display the full range of adjectival and adverbial modifiers.

Works Cited