

## Understanding the Linguistic Functions of Eyegaze in American Sign Language:

Robin Thompson, Clifton Langdon, Karen Emmorey

Eyegaze marks agreement in American Sign Language (ASL; Thompson, Emmorey, Kluender, 2006; Neidle et al., 2000). When producing an agreeing verb, ASL signers (native and late-learners) direct their gaze toward the location associated with the syntactic object, both for 'regular' agreeing verbs (subject marked first, object second) and 'backwards' agreeing verbs (object first, subject second). Directed eyegaze occurs in addition to manual agreement—the hands move toward locations associated with verbal arguments. Native signers do not mark eyegaze when producing plain verbs (verbs not marked manually for agreement, but sometimes displaced in space), however second language learners do (Thompson, Emmorey, Kluender, 2008).

We investigated whether sign perceivers are sensitive to eyegaze direction accompanying agreeing verbs. That is, do ASL perceivers attend to gaze direction and comprehend eyegaze as marking verb arguments? Or is direction in eyegaze simply a reflection of the production system's sensitivity to syntactic structure with no consequences for comprehension? Participants were asked to match a picture of a signer's eyegaze to a picture of an ASL verb. Four different verb pairings were used: 1) two agreeing verbs—one moving right, one moving left; 2) an agreeing and a backwards verb (Figure One); 3) an agreeing and a plain verb; 4) an agreeing verb and a spatially-displaced plain verb (Figure Two). If participants understand that eyegaze is required only for agreeing verbs and gaze marks the syntactic object, they should chose the agreeing verb "sentence" in which the signer looks at the location associated with the syntactic object.

The findings indicate even non-signers (N=21) are sensitive to gaze direction. Gaze choice for signing and non-signing participants was more accurate when correct gaze choice matched hand movement (conditions 1, 3). While all groups were less accurate for condition 4 (compared to 1&3), there was still a strong preference for the agreeing verb over the spatially-placed plain verb, suggesting choices were driven by perceived directionality of the sign/hand, not the end location. When grammatical eyegaze could not be predicted based on the direction of movement (condition 2, Figure 1) differences between groups arose. Only participants with native ASL knowledge (Deaf=22, hearing=16) or who acquired ASL fluently as an L2 (N=23) were equally accurate for backwards and regular agreeing verbs. Deaf signers who acquired ASL as a first language, but not natively (N=20, sign exposure before age 7, N=17, exposure after age 7), beginning ASL students (N=21), and hearing non-signers were all significantly more accurate selecting gaze direction for regular agreeing verbs compared to trials with backwards verbs. Thus early exposure to language (spoken or signed) appears critical for development of syntactic competence (in both the L1 and L2). Finally, the findings

reveal differences between eyegaze comprehension and production for proficient L2 learners. In production L2 signers over-generalized eyegaze agreement, marking objects of plain verbs. However, they demonstrated a clear preference for pairing eyegaze with agreeing verbs over plain verbs (even when spatially displaced). Thus, sensitivity to grammatical functions of eyegaze in ASL can be dissociated for comprehension and production.



Figure One: The correct answer (SUMMON, a “backwards” agreeing verb) requires knowledge that gaze is toward the syntactic object, not the endpoint of the movement.



Figure Two: The correct answer (HATE), requires knowledge that gaze is obligatory for an agreeing verb but not for a spatially displaced plain verb (MAKE).

Neidle, C., J. Kegl, D. MacLaughlin, B. Bahan, and R. Lee. 2000. *The Syntax of American Sign Language: Functional categories and hierarchical structure*. MIT Press, Cambridge, MA.

Thompson, R. L., K. Emmorey & R. Kluender. (2006) The relationship of eye gaze and agreement morphology in ASL: An eye-tracking study. *Natural Language & Linguistic Theory*.

Thompson, R. L., K. Emmorey & R. Kluender. 2008. Learning to look: The acquisition of eye gaze agreement during the production of ASL verbs. *Bilingualism: Language and Cognition*. (accepted pending revisions).