THE EVOLUTION OF SPATIAL DEVICES IN GESTURAL STORYTELLING

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A key communicative resource available to sign language users is the use of space to distinguish between referents and to express relationships between them. Signers can use space to convey a range of relational information, for example marking verb agreement by directing signs toward locations associated with distinct referents (Padden, 1988), or signaling shifts between 1st and non-1st person perspectives via shifts in bodily orientation (see Stec, 2013, for a review). While spatial tracking of referents is found in co-speech gesture (Perniss & Özyürek, 2015), evidence from young sign languages suggests that systematic use of spatial devices, or spatial modulation (Senghas & Coppola, 2001), emerges over successive cohorts of signers (Kocab, Pyers, & Senghas, 2014; Montemurro, Flaherty, Coppola, & Brentari, 2019) and is lacking in early stages of sign language emergence (Meir, Padden, Aronoff & Sandler, 2007).

We present an investigation of the cultural transmission of spatial devices using a novel experimental method. Drawing on artificial sign language experiments (Motamedi, Schouwstra, Smith, Culbertson, & Kirby, 2019) and the cultural evolution of stories (Bartlett, 1920; Mesoudi, Whiten, & Dunbar, 2006), we asked hearing non-signers in transmission chains to interpret and retell a short story narrated using improvised silent gesture.

We collected data from 54 participants in 9 chains of 6 generations each. The experiment was conducted over 3 days at a dedicated science area of a music festival. Participants first watched a video of the story depicted silently through pantomime before being presented with an incomplete 6 panel comic strip (see Fig. 1). To complete it, participants had to pick 3 out of 4 possible comic panels and arrange them according to their interpretation of the sequence of events depicted in the video. The story and reconstruction task were designed so that multiple orderings of panels were plausible. Participants were then asked to record their own pantomime videos, using their choice of panels as a prompt.

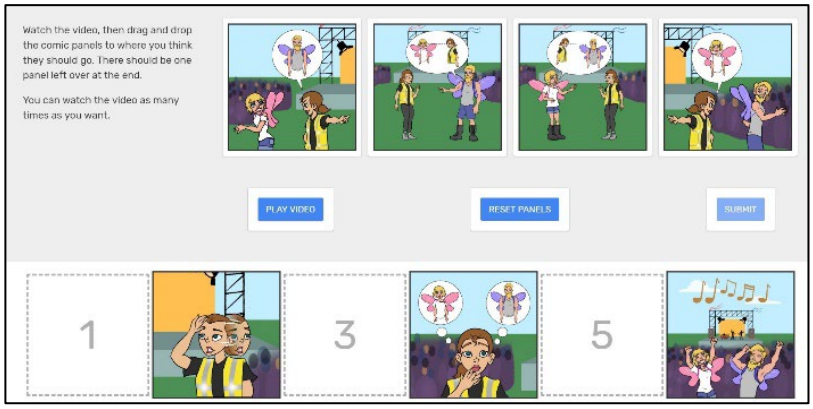

Figure 1. The interface of the story reconstruction task, operated via a touchscreen by dragging and dropping comic panels from the top right to the empty slots (marked 1, 3 and 5).

Participants at each generation viewed the video from the previous member of their chain, except at Generation 1, where participants watched a pre-recorded video in which an experimenter depicted a randomly selected story sequence in which all gestures were directed toward the camera and characters were identified using lexical labels (e.g. BEARD for the male character). The same seed video was used for all chains. During recording, participants saw a live video feed of themselves. In 5 out of 9 chains, both live and recorded video output were flipped horizontally to show a mirror image of the participant in order to identify a possible effect of visual feedback on participants' use of directional vs lexical labelling strategies.

Initial video coding finds that participants identified characters using a mixture of lexical labels and directional strategies, typically shifting their body orientation when embodying different characters. The use of this body shifting strategy increased over generations. Our preliminary findings are thus potentially in line with recent work by Motamedi, Schouwstra, Smith, Culbertson, & Kirby (2018), which found that participants in transmission chains used spatial gestures systematically to identify referents. However, in contrast to previous gesture transmission experiments, which found that without a pressure for efficiency imposed by dyadic communication, participants produced longer, more elaborate gesture sequences (Motamedi et al., 2019), we found that participants' gesture videos decreased in length over generations, despite the absence of dyadic communication in our experiment. This may be due to the visual presentation of our stimulus items providing a shared referential environment or common ground (Clark, 1996) across generations, allowing for efficient identification of characters from simple gestures. Further analysis will identify whether generational transmission in our chains led to systematic use of spatial gestures, and how efficiently this strategy was combined with lexical labelling.

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