

Why are some individuals better gesturers? Multiple cognitive factors influence performance

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Gestures are all around us, and they help us communicate.¹⁻² We instinctively point to select a pastry or happily wave to get a friend's attention. Simultaneously, we can witness a paucity of gesture use in environments that could facilitate successful communication ***across cultural contexts*** (e.g., airports and hospitals), as well as in retail spaces that predominately use sign languages. **Why are some individuals better gesturers?** Using novel online webcam eye tracking³ during a behavioral task, we investigated key cognitive factors hypothesized to contribute to a person's willingness or resistance to gesturing, specifically language experience, attention, and working memory. The experiment was a 2x3 block design that measured performance for expressive and receptive gesturing of tangible ("drinking"), intangible ("surprised"), and neutral ("triangle outline") targets. We performed preliminary analysis of time-locked data from 15 hearing subjects (see Demographics), 5 monolingual (H1, English only) and 10 bimodal-bilingual (H2, English and American Sign Language, ASL). Behavioral data were analyzed with linear mixed-effects statistical models in R. Eye tracking data were analyzed with interpolated gaze density mapping in MATLAB. Preliminary results revealed striking group differences. H2 was more accurate when perceiving gestures (receptive), and H1 was more accurate, but slower, when producing gestures (expressive). H2 was more accurate when perceiving and producing neutral gestures (no semantic context, "triangle outline"), but H1 was more accurate when producing intangible gestures (low semantic context, "surprised"). ***Both groups were comparable and most accurate when perceiving and producing tangible gestures (high semantic context, "drinking")***. H2 used a wider visual attention area (VAA) than H1 overall. Higher accuracy related to larger VAAs, and lower accuracy related to smaller VAAs. Group differences in expressive, especially intangible, gesturing are hypothesized to be due to ASL semantic interference in H2. And, group differences in receptive, especially neutral, gesturing are hypothesized to be due to lack of visual linguistic experience in H1. Additionally, gesturing appears to rely on our visual attention systems to support successful performance. Through combined online webcam eye tracking and behavioral analyses, new insight is revealed about the complex cognitive factors that impact gesture use, such as language experience, attention, and working memory. This work has broad scientific and translational impact by elucidating factors that might drive a person's proclivity to gesturing, and ultimately support successful and comprehensive multi-modal (gesture+language) communications ***across cultural contexts***.

1. **Petitto** (1987). On the autonomy of language and gesture... *Cog.* 2. Kang & Tversky (2016). From hands to minds: Gestures promote understanding. *Cog. Research.* 3. Finger et al., (2017). *LabVanced*. Intl. Conf. on Comp. Social Sci. See www.petitto.net/published for full list of **Petitto** publications.