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Gesture counteracts gender stereotypes conveyed through subtle linguistic cues

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Despite increased attempts to express equality in speech, biases often leak out through subtle linguistic cues. For example, the subject–complement statement (SCS, "Girls are as good as boys at math") is used to advocate for equality but often reinforces gender stereotypes (boys are the standard against which girls are judged). We ask whether stereotypes conveyed by SCS can be counteracted by gesture. Two preregistered studies with 8- to 11-y-old children ($N = 320$ total) investigate whether an *equal* gesture—two palms placed at the same height—mitigates the gender stereotype induced by SCS. Children who saw the *equal* gesture along with SCS were more likely to express egalitarian beliefs than children who saw no gesture or an *unequal* gesture. Children can extract meaning from gesture when making stereotypical inferences, suggesting that the *equal* gesture may prove to be an innovative, and simple, intervention to counteract stereotypes introduced by subtle language.

gesture | stereotype | subtle language | children | intervention

Language is recognized as the primary means for communicating stereotypes (1). Despite a decline in the explicit expression of biases in today's society (2), stereotypes continue to be transmitted implicitly through subtle linguistic cues (3–5). One example, commonly used by well-intentioned caregivers, teachers, and public figures, is the subject–complement statement (SCS): "Girls are as good as boys at math" (3). Though egalitarian on the surface, the syntactic structure of the SCS creates an asymmetrical comparison between two groups: The group in the subject position (girls) is the variant, and the group in the complement position (boys) is the reference point (3, 5–7). Both adults and children infer from these statements that the reference group is more prominent, skilled, and naturally talented than the variant, thus perpetuating the gender stereotype that "boys are naturally talented at math" (3, 7). In addition to communicating preexisting gender stereotypes, the SCS can inform school-age children of emerging stereotypes about gender-neutral activities (5).

This study introduces a second modality, gesture, which is produced along with speech and has the potential to disrupt gender stereotypes transmitted through speech. The gestures that speakers spontaneously produce as they talk often convey messages that differ from the message conveyed in the accompanying speech (8). Communication partners, both old (9, 10) and young (11, 12), are able to process and understand messages conveyed only in gestures in teaching and learning contexts. However, little is known about whether children attend to, and interpret, gestures that differ from speech in contexts requiring social inferences. Here, we ask whether an *equal* gesture—two palms, fingers toward each other, placed at the same height—can counteract the stereotypes conveyed by subtle linguistic cues, such as the SCS. Adults associate gestures on the vertical plane with competence (13); gestures produced at the same height can therefore signal equal competence. If children interpret the *equal* gesture as indicating equal competence, they may be reluctant to form the stereotype implied in the biasing speech.

Results

Study 1 asked whether the *equal* gesture mitigates the biasing effect of the SCS on gender stereotypes. 8- to 11-y-old children ($N = 160$) were introduced to a fictional group from a faraway planet and completed four trials. Within each trial, children watched a short video of an actress reading an SCS about gender equality in a novel domain to minimize the influence of preexisting gender stereotypes on children's inferences (e.g., "*Girls are as good as boys at yuzzing.*"). The actress in the No Gesture condition read the SCS with her hands in the resting position (Fig. 1*A*). In the Equal Gesture condition, the actress made the *equal* gesture while reading the SCS, raising both hands simultaneously to shoulder level, with the fingertips facing each other and perpendicular to the palm (Fig. 1*B*). Following each video, we assessed children's endorsement of the stereotype (e.g., "Are girls naturally better at yuzzing, or are boys naturally better at yuzzing?"). A stereotype endorsement score (ranging

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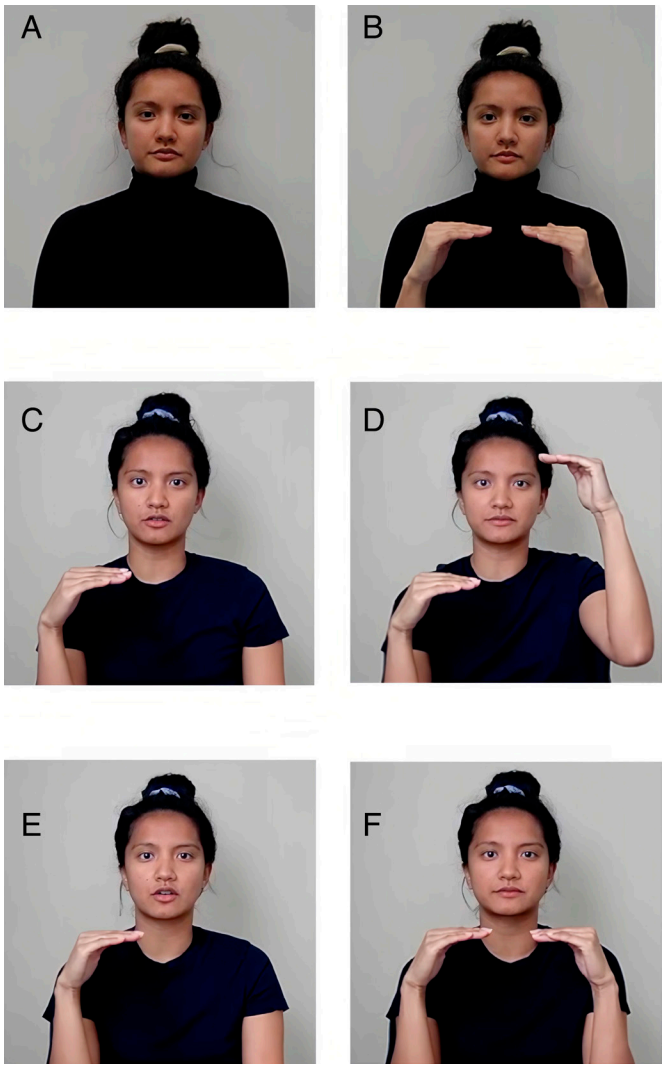

Fig. 1. An illustration of no gesture (*A*) and an *equal* gesture (*B*) in Study 1; and an illustration of an *unequal* gesture (*C* and *D*) and an *equal* gesture (*E* and *F*) in Study 2.

from 0 to 1) was created by calculating the proportion of trials in which a child chose the reference group as possessing greater natural ability (natural ability was measured in two ways—more ability and less effort needed to achieve). We also assessed the strength of children's stereotypical inferences by measuring the extent to which they believed the reference group possessed greater natural ability (e.g., "How much do you think boys are naturally better than girls at yuzzing; are they a little bit better, some better, or a whole lot better?").

Children in the Equal Gesture condition were less likely to hold a stereotype endorsing the reference group's natural ability than children in the No Gesture condition (main effect of condition, Wald $\chi 2 = 11.65$, $P < 0.001$; Fig. 2, *Left*). One-sample *t* tests (not preregistered) suggested that children who saw the *equal* gesture did not show a bias favoring either gender group, as their stereotype endorsement scores did not differ from chance, $M = 0.45$, $SD = 0.31$, $t(79) = -1.51$, $P = 0.135$. Yet, consistent with previous findings (4), children in the No Gesture condition made stereotypical inferences in favor of the reference group significantly more often than chance, $M = 0.61$, $SD = 0.32$, $t(79) = 3.19$, $P = 0.002$. In terms of the strength of children's stereotypes, children in the Equal Gesture condition also displayed lower bias than children in the No Gesture condition ($B = -0.38$, $SE = 0.16$, $P = 0.020$).

Adding the *equal* gesture to the SCS prevented children from inferring a new stereotype from a subtly biased linguistic cue. However, children's lower biases in the Equal Gesture condition might have resulted from the gesture disrupting how verbal information was encoded, rather than the *equal* gesture signaling equal competence. Study 2 pitted the *equal* gesture against an *unequal* gesture (two hands held at different heights) to test this hypothesis. If gestures disrupt the encoding of speech, both types of gestures should produce the same mitigating effect on stereotype formation.

An additional 160 8-to-11-y-old children completed the same tasks as in Study 1 except that one group saw the actress make an *unequal* gesture; the other saw her make an *equal* gesture. In the Unequal Gesture condition, the actress sequentially lifted each hand to different heights when each group was mentioned (Fig. 1 *C* and *D*). The group in the subject position in an SCS (i.e., the variant group) is considered less naturally skilled; it was therefore paired with the gesture at the lower position. The reference group was paired with the gesture at the higher position (e.g., "*Girls* <the right hand lifted to shoulder level> *are as good as boys* <the left hand lifted to forehead level> *at yuzzing*."). In other words, the *unequal* gesture was presented in a way that aligned with the stereotype implicit in the SCS. The *equal* gesture in Study 2 was also produced sequentially (Fig. 1 *E* and *F*; e.g., "*Girls* <the right hand lifted to shoulder level> *are as good as boys* <the left hand lifted to shoulder level> *at yuzzing*."), so that its form would be comparable to the *unequal* gesture's form. The final display of *equal* gestures in both studies was identical, with two hands facing each other at the same height.

Children who saw the *equal* gesture were less likely to make stereotypical inferences favoring the reference group when hearing biased language than children who saw the *unequal* gesture (main effect of Condition, Wald $\chi 2 = 22.63$, $P < 0.001$; Fig. 2, *Right*). When the *equal* gesture was presented, children displayed egalitarian beliefs ($M = 0.48$, $SD = 0.30$, $t(79) = -0.65$, $P = 0.517$). In contrast, children who saw the *unequal* gesture were more likely than chance to attribute greater natural ability to the reference group ($M = 0.72$, $SD = 0.30$, $t(79) = 6.67$, $P < 0.001$). Additionally, children in the Equal Gesture condition demonstrated weaker stereotypes compared to those in the Unequal Gesture condition ($B = -0.91$, $SE = 0.15$, $P < 0.001$).

Discussion

Subtle stereotypes permeate everyday language. Our findings indicate that gestures produced along with this language can ameliorate its stereotyping effects. Placing two hands at the same height (an *equal* gesture) counteracts the stereotyping messages transmitted through subtle biasing linguistic cues. Though the equal gesture tested here presented four extended fingers, we suspect that what is essential for the equal gesture to be effective is that both hands be positioned at the same level on the vertical axis, rather than the shape of the hands. Varying the gesture used to convey equality would be an interesting question for future work (for more discussion, see *SI Appendix*). Further research is also needed to assess the durability of the *equal* gesture's mitigating effects in real-world settings.

The pernicious stereotypes implicit in the structure of the SCS, if not counteracted, can affect a child's interests in, and performance on, an activity and later take a toll on career choices (14, 15). Gesture is, of course, not the sole solution for addressing stereotyping. It is nevertheless one easily implemented solution. Our research presents groundbreaking evidence that the *equal* gesture can potentially serve as an effective intervention in mitigating stereotypes introduced by subtle linguistic cues.

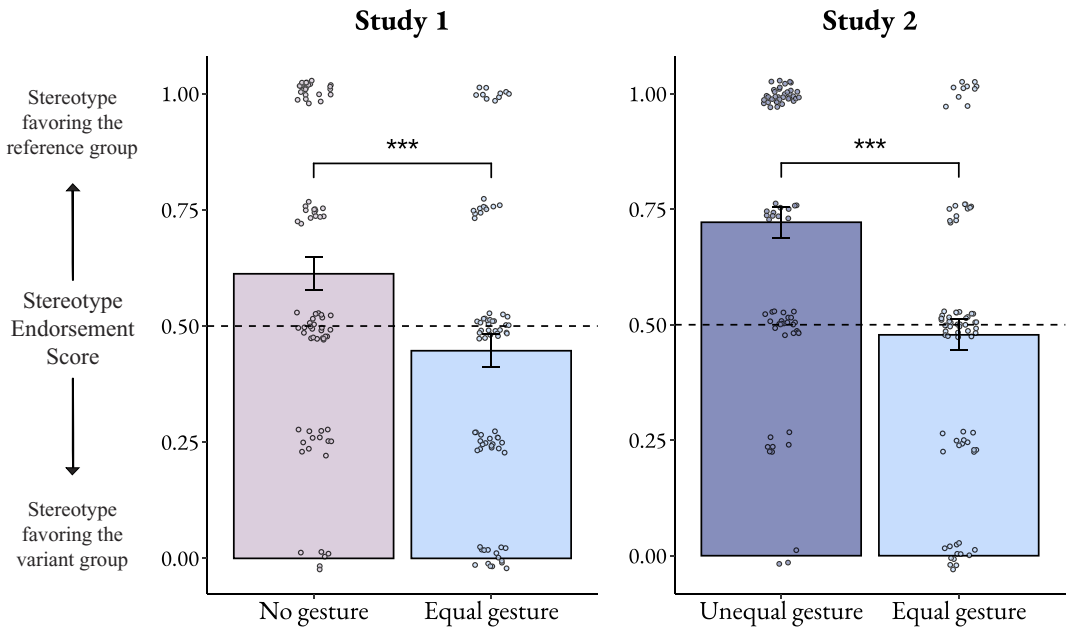

Fig. 2. The average proportion of trials in which participants attributed higher natural ability to the reference group in Study 1 (*Left*) and Study 2 (*Right*). Circles represent the data of individual participants. Error bars represent SEs. ***$P < 0.001$, indicating the significant main effect of condition in mixed-effects logistic regression models, as pre-registered.

Materials and Methods

Parental consent and children's verbal assent were obtained prior to each study. Participants began the experiment with a practice task introducing them to the test measures. After the practice, the experimenter introduced a faraway planet where alien children enjoyed playing games that were unfamiliar to the participants. Children then completed four trials comparing alien boys' and girls' natural ability in four novel domains. Within each trial, children first watched a video of an actress making a subject–complement statement accompanied by no gesture vs. the *equal* gesture (Study 1) or by the *unequal* gesture vs. the *equal* gesture (Study 2). The experimenter then prompted the child to repeat back the sentence played in the video. Next, the child was asked to decide whether boys or girls are naturally better at (or need to work harder to be good at) this novel activity, as well as how much the selected gender group is naturally better than the unselected gender group (or how much harder the selected gender group needs to work than the unselected gender group to be good) at this activity.

See *SI Appendix* for participant information, stimuli, procedure, and detailed analyses. The Institutional Review Board of the University of Chicago approved all procedures.

Data, Materials, and Software Availability. Anonymized data, R scripts, and study materials have been deposited in Open Science Framework (https://osf.io/gqypb/) (16).

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