

# Gestures are modulated by social context

## A study of multimodal politeness across two cultures

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This paper investigates gesture as a resource for marking politeness-related meanings. We asked 14 Korean and 14 Catalan participants to retell a cartoon, once to an unknown superior and once to a close friend.

Participants in both languages curtail gestures when interacting with a socially distant superior. Speakers of both languages produced fewer gestures when addressing the superior, reduced their gesture space, decreased the encoding of MANNER, and reduced the use of character-viewpoint gestures. We see the decrease in gesture frequency and the less frequent encoding of MANNER as indicators of lower levels of iconicity when talking with status superiors. Curtailing gesture marks a less playful communicative context, and a more serious and deferential persona. Altogether, our research speaks to the importance of politeness in gesture production, and the social nature of gestures in human communication.

**Keywords:** iconicity, perspective, pragmatics, social deixis, audience design, social distance

## Introduction

Gesture production is known to vary as a function of many different factors. This includes individual differences (Chu, Meyer, Foulkes, & Kita, 2014; Lempert, 2011), information status (Krahmer & Swerts, 2007), situational factors (Kelly, Byrne, & Holler, 2011), and cultural factors (Iverson, Capirci, Volterra, & Goldin-Meadow, 2008; Kita & Ide, 2007), among many others. The current paper explores the way variation in gesture becomes a resource for communicating

politeness-related meanings, namely the marking of social distance. We look at two languages with very different politeness systems: Korean and Catalan. Korean is known as a language that explicitly marks social distance through the overt use of grammaticalized honorifics (L. Brown, 2015; Sohn, 2001). On the other hand, Catalan contains no such grammatical system of honorifics and the politeness system is oriented towards belonging, solidarity and common ground (Dalmau & Gotor, 2007). Whereas work on politeness has traditionally focused on verbal markers, our study contributes to an emerging recognition that the phenomenon is inherently multimodal (L. Brown & Prieto, 2017).

A number of studies in the nonverbal behavior literature show that when interacting with status superiors, status inferiors gesture less frequently as part of their attempts to be polite (L. Brown & Winter, 2019; Burgoon & Dunbar, 2006). In contrast, friends use gestures more frequently amongst each other to convey involvement and immediacy (Guerrero & Floyd, 2006). Parrill (2010b) notes that “people tend to gesture more *naturally* when talking to a friend [emphasis added]”. This leaves the question open as to what exactly it means to gesture more or less “naturally”. Does social distance only affect the frequency of gesture, or are there also qualitative differences in the types of gesture and the manner of execution that have yet to be explored?

In this paper, our goal is to build up a comprehensive picture of how speakers modulate gesture according to social distance in two different languages. We look not only at gesture frequency, but also gesture size, hand shape, content (PATH, MANNER, GROUND) and viewpoint (character viewpoint, observer viewpoint). Our research aims to contribute to our understanding of how speakers vary their gesture production according to who they are talking to, as part of what is known as ‘audience design’ or ‘recipient design’ (Blokpoel et al., 2012; Newman-Norlund et al., 2009).

The specific research questions that we addressed were two-fold, and can be summarized as follows: First, in what ways do speakers modulate gesture production according to social distance in terms of the following factors?

1. gesture frequency
2. gesture size
3. hand shape
4. content of gesture events (PATH, MANNER, GROUND)
5. viewpoint (character viewpoint, observer viewpoint)

Second, how are these changes modulated across two languages and cultures (Korean and Catalan) with different systems of verbal politeness? We hypothesized that speakers would curtail their gestures when social distance is increased,

and that this pattern would be more profound for Korean as an honorific language.

## Background

### The multimodality of politeness

Politeness is a key topic in pragmatics. Whereas earlier work sought to establish cross-linguistic and cross-cultural universal features of polite language (e.g., P. Brown & Levinson, 1987), more recent studies see politeness as a social action that is highly culture- and context-dependent (see Kádár & Haugh, 2013). Here, we follow P. Brown's (2015) broad definition that "politeness is essentially a matter of taking into account the feelings of others as to how they should be treated, including behaving in a manner that demonstrates appropriate concern for interactors' social status and their social relationship." We focus particularly on how interactors modulate gesture according to social distance.

We follow Leech (2016, p.126) in using the term "social distance" to include both "vertical distance" (i.e., distance in terms of power or authority) and "horizontal distance" (i.e., distance in terms of solidarity, familiarity and intimacy). Research has shown that social distance is one driving factor of politeness-related expressions (see Goldsmith, 2007, p.227 for overview). Holtgraves and Yang (1992) found that Korean and American respondents used more polite request strategies when addressing superiors and strangers, with Koreans varying their responses more strongly.

Recent research has shown that politeness-related meanings are not just communicated via words alone, but they are also communicated multimodally (see L. Brown & Prieto, 2017, for review). Winter and Grawunder (2012) found that honorific speech in Korean was lower pitched, clearer, and less variable. Hübscher et al. (2017) and Idemaru et al. (2019) found similar results for Catalan and Japanese, respectively. Brown et al. (2014) and Idemaru et al. (2020) showed that listeners actively use these nonverbal phonetic cues to make inferences about the intended politeness of a message. Nadeu and Prieto (2011) showed that vocal features and facial cues co-determined perceived politeness-related meanings. Brown and Winter (2019) found that interactions with status superiors in Korean TV dramas featured erect but constrained body positions, direct bodily orientation towards the status superior, and suppression of touching and gestures.

## Gesture variation

Speakers modulate their gesture production in various ways, including for the purposes of audience or recipient design. Gestures occur at a higher rate and are larger in a telephone dialogue than in a monologue to a tape recorder (Bavelas, Gerwing, Sutton, & Prevost, 2008). Gestures are also larger (Bavelas et al., 2008) and executed in more elevated positions (Holler et al., 2011) when the speaker is visible (see Bavelas & Healing, 2013). Speakers gesture more frequently to a new addressee rather than one with whom they have performed the same task before (Galati & Brennan, 2014), to a responsive or attentive addressee (Beattie & Aboudan, 1994; Jacobs & Garnham, 2007), to an addressee with whom they share common ground (Holler & Wilkin, 2009), and when communicating high-stakes information (Kelly et al., 2011).

Another fertile area of gesture variation involves the encoding of motion events. Following Talmy (1985), motion events can be broken into PATH (the trajectory of the motion, such as upwards, downwards, sideways), MANNER (the type of motion, such as sliding, bouncing, rolling), and GROUND (depicting an object that is in relation to the movement, e.g., depicting a door when talking about someone running through one). For example, when gesturing a scene from the animated cartoon *Canary row* in which Sylvester rolls down the street with a bowling ball in his stomach, some people gesture both PATH and MANNER (hand rotating and moving downwards), whereas some just encode PATH (hand moving downwards with no rotation), and others just MANNER (hand rotating, but no downward movement), although the last of these is only common in children (McNeill, 2005). Previous studies of variation in the gesturing of motion events have tended to focus on cross-linguistic differences (see next section). But Parrill (2010a) showed that speakers are less likely to encode GROUND when they already share knowledge of the event with the interlocutor, showing that motion events are sensitive to social factors.

When retelling stories, speakers can adopt two types of viewpoint: Character viewpoint (the speaker's hands become the hands of the character in the narration, and the speaker's body becomes the character's body) and observer viewpoint (the whole of the character is depicted by the hand). For instance, McNeill (2011, p.192) showed that some speakers depict the action of Sylvester swinging on a rope by clasping both hands together near the shoulder as if holding the rope (character viewpoint), while others simply move the hand transversally across the body (observer viewpoint). Beattie and Shovelton (2002) noted previously that observer-viewpoint gestures convey less information to the interlocutor, particularly regarding relative position and size. Although no previous studies have looked at the modulation of viewpoint for social meanings, Parrill (2010b)

showed that this parameter of gesture may be sensitive to discourse factors. Participants used character-viewpoint gestures more frequently when retelling central events in a story (see below for definition of “central events”).

### Gesturing in different languages and cultures

Gesture production is known to differ in various ways across languages and cultures (see Kita, 2009; Özyürek et al., 2018), including gesture frequency and size. So (2010) found that American English speakers gesture more frequently than speakers of Mandarin, purportedly due to the greater acceptability of gesture in American culture. Similarly, Nicoladis et al. (2018) found that French-English and Spanish-English bilinguals gestured more frequently than Chinese-English or Hindi-English bilinguals. In contrast, Taiwanese mothers gesture more than American mothers when interacting with young children (Goldin-Meadow & Saltzman, 2000). Meanwhile, some studies show that speakers of Romance languages produce comparatively larger gestures (e.g., Iverson, 2008 for Italian in comparison to English). It may be the case, however, that some culture-specific preferences for gesture production are influenced by different story-telling styles (see Nicoladis et al., 2018, for discussion).

Languages also show different preferences in the encoding of PATH, MANNER and GROUND due to motion event typology (Talmy, 1985). In satellite-framed languages such as English, PATH is typically encoded in a satellite structure such as a prepositional phrase (*climb up*, *roll down*), whereas MANNER is encoded on the verb (*climb* up, *roll* down). In verb-framed languages such as Korean and Catalan, PATH is encoded on the main verb (e.g., Korean uses *naylye-kata* for ‘go down’, which is a compound of the verbs for ‘fall’ and ‘go’, respectively), whereas MANNER appears outside of the main verb structure (e.g., Korean often expresses MANNER with ideophones such as *teykwul-teykwul* for ‘rolling’). A number of studies have explored how these typological differences relate to different preferences in the way that information is packaged in speech and gesture (A. Brown & Chen, 2013; Kita & Özyürek, 2003; McNeill & Duncan, 2000), and how these patterns emerge in child language (Allen et al., 2007; Özyürek et al., 2008).

Certain gestures may be avoided in some languages due to culture-specific taboos (see Kita, 2009 for review). The raising of the thumb in Anglophone cultures is used for the “okay” gesture, but this same gesture is considered taboo in some countries, such as Nigeria and Ethiopia. In Ghana, it is taboo to point with the left hand (Kita & Essegbe, 2001), while in Yoruba culture it is impolite to point to an elder with the index finger (Orie, 2009). Since the avoidance of taboo gestures is closely related to politeness, these culture-specific factors could influence the modulation of gesture in relation to social distance.

## Methodology

### Data collection

The Catalan data were collected at Universitat Pompeu Fabra, Barcelona. The Korean data were collected at Konkuk University, Seoul.

Our participants took part in dyad recordings with a partner in a sound-proof recording booth. The participant and the partner sat facing each other on chairs fixed to the ground. The distance between the front edges of both chairs was 84 cm, roughly similar to how people may sit at a coffee shop table, or on a train. Beaulieu (2004) showed that in a situation where participants could position their own chair to interact with an unknown interlocutor, the distance between the chair fronts ranged from 50 to 130 cm. Our seating arrangement was well within this common range.

Videos were recorded from a side-on camera angle. It was chosen in order to capture gesture height, and also to facilitate later analysis using cross-recurrence analysis (Paxton & Dale, 2013). The videos are available on request (please contact corresponding author).



**Figure 1.** Setup

### Procedure

Each of our participants (14 for each language) participated in two data collection sessions: one with a friend and one with a status superior. These two sessions took place on different days within a four-day period, with the order being counterbalanced. Although they were not instructed to do so, some of the participants (five for Korean and three for Catalan) dressed more formally on the day when they interacted with the superior (see Figure 1), hinting that bodily adornment is another modality for creating a “polite bodily image” (Withey, 2015).

Each session involved four interactional tasks, which were performed in the following order: a natural conversation, a description of a “Tweety Bird” cartoon *Canary row*, a map task and a role-play. For the current paper, we focus only on the “Tweety Bird” task, which has been used extensively in previous studies of gesture (Alibali & Don, 2001; Kita, 2000; Kita & Özyürek, 2003; McNeill, 2005, 1992; McNeill & Duncan, 2000). This task is known to yield a large range of manual gestures, and elicit a high number of motion event descriptions. The main participants watched the first 2:04 minutes of the cartoon in a separate room before relaying the content to their partner.

The interactions were video recorded using a Canon VIXIA HF M 41 camcorder for Korean, and a Panasonic HPX-171 for Catalan. The lengths of the retellings were on average 2:11 (friend) and 1:47 (superior) in Korean, and 2:18 (friend) and 2:15 (superior) for Catalan. The fact that the Korean participants spoke less in the socially distant situation is consistent with Winter and Grawunder (2012).

## Participants

Our sample included 14 Korean native-speaking participants and 14 Catalan native-speaking participants (7 male; 7 female for each language). Data collected from one male Korean main participant was eliminated from the analysis, since he failed to perform the task under analysis here.<sup>1</sup> The participants were all undergraduate students, aged 22 (range 19–27;  $SD=2.3$ ) on average for Korean and 19 for Catalan (18–24; 1.6). All Korean participants were from the Seoul/Gyeonggi area. All Catalan participants were Catalan-dominant (71%) bilingual speakers of Catalan and Spanish living in and around Barcelona. Participants are referred to with a participant number preceded by “C” for Catalan and “K” for Korean.

As noted above, participants completed the same tasks with a friend and with a status superior. Participants were asked to bring a same-gender friend with them (although one male Korean speaker brought a female friend). For the superior interactions, our experiment included a confederate. For Korean, this confederate was a male 60-year-old professor of English literature, who originally came from North Gyeongsang Province. For Catalan, the confederate was a 64-year-old pensioner living in the neighborhood of the University, who was also a Catalan-dominant bilingual speaker. Neither of the confederates were known to the participants or affiliated with the research. All participants were paid a fee pro-rata to the number of recordings in which they took part.

1. This participant successfully completed the retelling with the friend, but with the professor he discussed his views on the cartoon without actually describing any of the events.

## Coding and analysis

We used ELAN (*ELAN (Version 6.0)*, 2020) to annotate all manual gestures, including iconic, deictic, metaphoric and beat gestures. The annotation focused solely on the participant; we did not consider data from the confederate / the partner. The frequency of gestures involved counting the total number of gesture phrases.

All gesture phrases were then analyzed for the location of the gesture peak (also known as “gesture apex”), which we use here as an indicator of gesture size. The location of the peak was coded on three planes: vertical (the up/down axis from the participant’s perspective), transversal (the left/right axis), and sagittal (the front/back axis) and divided into “large” and “small” on these three dimensions (Table 1). The large/small divisions are inspired by McNeill’s (1992, pp.86–89) coding conventions for gesture space. “Large” gestures are defined as those that are above the center-center in the vertical plane and beyond the center in transversal plane. In addition, we define gestures that cross the midpoint between the participants as being “large” on the sagittal plane.

**Table 1.** Categories coded for gesture size

	Vertical Plane	Transversal Plane	Sagittal Plane
Large	Peak above chest	Peak beyond shoulder	Peak to the right of mid-point
Small	Peak below chest	Peak beyond shoulder	Peak to the left of mid-point

We also coded whether gestures were single- or double-handed, and whether the hands had overall “open” or “closed” hand shapes (cf. Ren-Mitchell, 2019; Woodin et al., 2020) “Closed” hand shapes were operationalized by at least three fingers being pressed together. Gestures that use two hands and/or “open” hand shapes are likely to appear as perceptually larger.

For the analysis of motion events (PATH, MANNER and/or GROUND) and viewpoint (character-viewpoint versus observer-viewpoint) we focused on the representation of 16 central events in the cartoon (see Appendix). The events that we selected are based on a subset of the analysis provided by McNeill (1992, pp.366–374), attributed to Elena Levy. We focused only on those that we classified as “central” rather than peripheral, following Stein and Glenn (1979) and Parrill (2010b). Central events are defined as actions that feature “initiating events” that set up a problem in the story, “attempts” by the protagonist to solve the problem, or the “consequences” of the protagonist’s actions. They also include “setting” (i.e., the introduction of main characters), and the “internal responses” and “reactions” of the protagonist (Parrill, 2010b). Coding of the content of motion events

involved analyzing whether each gesture encoded PATH, MANNER and/or GROUND. Viewpoint featured a two-way analysis: character or observer.

For all the analyses, the entire dataset was double-coded by two independent coders, who were the second and third authors of the paper. The Korean data was coded initially by the second author, and then independently double-coded by the third author. For the Catalan data, the same process was followed, but in the reverse order: the third author did the initial coding, and the second author performed the independent double coding. The second and third authors, in collaboration with the first author, then discussed discrepancies. Final levels of agreement exceeded 90%. The coding methodology was devised by the first, second and third authors.

### Statistical analysis

All summary data and analysis code used for the statistics reported in this paper can be found under the following publicly accessible Open Science Framework repository: <https://osf.io/fdbw7/>. All analyses were conducted with R version 4.0.2 (R Core Team, 2019) and the tidyverse package version 1.3.0 for data processing (Wickham et al., 2019). Inferential statistics were computed with Bayesian linear mixed effects models using the brms package version 2.13.3 (Bürkner, 2017).

For the analysis of gesture frequency, we used negative binomial regression, an extension of Poisson regression, because the main dependent measure was a count variable with no known upper bound (Winter, 2019). Poisson regression is similar to logistic regression in that it can be used for discrete counts, with the key difference being that Poisson regression is preferred when there is no clear upper bound, as is the case here, where we do not know the maximum number of gestures a speaker might produce. With an exposure variable controlling for differences in trial duration, a Poisson regression analysis is conceptually analogous to an analysis of gesture rates (count per second), but preferred over a rate analysis for several reasons detailed in Winter and Bürkner (2021). We use the specific variant of negative binomial regression because of potential overdispersion (excess variance) in our data.

All other variables (vertical size, transversal size, sagittal size, one versus two-handedness, character versus observer viewpoint), were represented as binomial regression problems, modeling the proportion of the count variable of interest (e.g., the proportion of vertically large gestures) out of the total number of gestures. All models were specified with the dependent variable regressed onto the fixed effects ‘Condition’ (superior versus friend) and ‘Language’ (Catalan versus Korean), as well as the interaction between these two factors. The models always included random intercepts for participant, as well as by-participant-varying ran-

dom slopes for the ‘Condition’ effect. Our models do not include an item random effect because analyses were performed on aggregate counts per subject.<sup>2</sup> To aid the interpretation of main effects in the presence of interactions, both fixed effects were deviation coded ( $-0.5$ ,  $+0.5$ ), with the friend ( $-0.5$ ) and Catalan ( $-0.5$ ) being the respective reference levels (superior =  $+0.5$ , Korean =  $+0.5$ ). We used weakly informative ‘regularizing’ priors with a normal distribution centered at zero and a standard deviation of 2 for all coefficients. MCMC sampling was conducted with 4 chains and 2,000 post-warm-up iterations each (4,000 warm-up samples; all Rhat values = 1.0; no divergent transitions). Posterior predictive checks revealed no systematic discrepancies between the real and simulated data.

## Results

### Gesture frequency

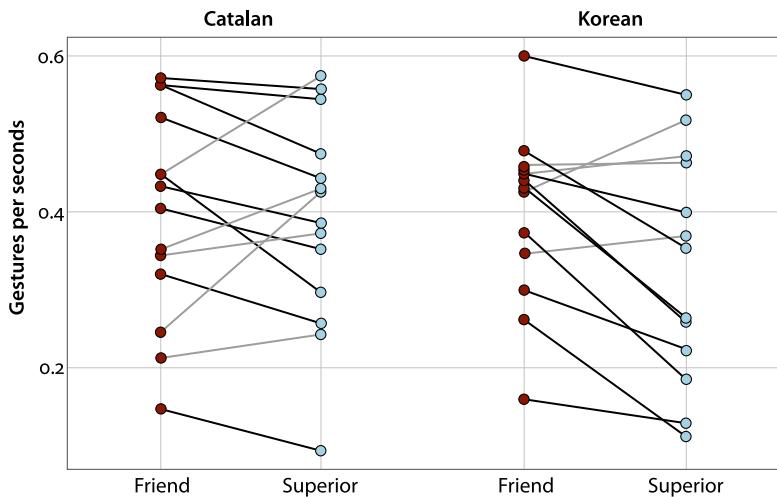
Overall, 1,453 gestures were produced in the interaction with the friend (54%), compared to only 1,217 gestures with the superior (46%). The contrast was more pronounced in Korean ( $N=689$  gestures with the friend; 483 with the superior) than for Catalan ( $N=764$ ; 734). When the duration of the retellings is taken into account, Catalan participants produced gestures at roughly the same frequency when speaking to a friend (23.7 gesture phrases per minute) or to a superior (23.3), whereas the Korean participants decreased their gesture frequency from 24.2 to 20.7. Looking at individual differences in terms of gesture rates (controlling for duration), for Catalan, 9 speakers produced fewer gestures per second when speaking with the superior (5 more). For Korean, also 9 speakers produced fewer gestures per second (4 more).

The Bayesian mixed effects negative binomial regression model (with an exposure variable controlling for duration) indicated a negative overall condition effect (fewer gestures in the superior context,  $-0.12$ ) with a 95% Bayesian credible interval that did not span zero  $[-0.24, 0.0]$ . The posterior probability of this effect being above zero was  $p_{\beta>0}=0.02$ . There was a trend for Korean speakers to produce even fewer gestures, but no substantial evidence in favor of an interaction effect:  $-0.17$ , 95%  $[-0.41, 0.06]$ ,  $p_{\beta>0}=0.076$ . Thus, there was an overall tendency

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2. The Tweety task constitutes only one item (since only one video was watched). It would theoretically be possible to break up the retellings into individual items (e.g., sub-events), however, since not all participants encoded all sub-events, this makes the item distribution too sparse. We thus went with the simpler, subjects-only analysis.

for fewer gestures in the superior context which was much more pronounced for Korean than for Catalan.

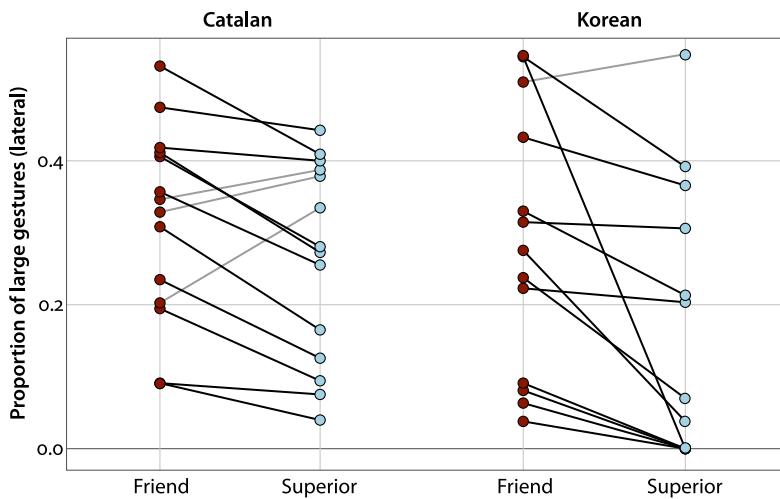


**Figure 2.** Gesture rate for Catalan and Korean speakers; each line represents a separate individual; black lines represent participants who lowered their gesture rate when speaking with the superior, grey lines show participants who increased their gesture rate when speaking with the superior

#### Gesture size

Speakers produced more large gestures with the friend than with the superior, but there was only a reliable effect on the transversal plane. A Bayesian model (mixed logistic regression, out of total number of gestures) indicated that when interacting with the superior, there were overall fewer ‘large’ gestures on the lateral plane (logit coefficient:  $-0.57$ , 95% CI:  $[-0.91, -0.30]$ ), with a low posterior probability of this effect having the reverse sign ( $p_{\beta > 0} = 0.0$ , no posterior samples above zero), shown in Figure 3. There also was some support, although substantially weaker, for there being fewer large gestures on the sagittal plane (logit coefficient:  $-2.35$ , 95% CI:  $[-4.96, 0.09]$ ,  $p_{\beta > 0} = 0.03$ ). There was no strong evidence for a consistent condition difference in terms of vertically extended gestures (logit coefficient:  $-0.28$ ,  $[-0.77, +0.19]$ ,  $p_{\beta > 0} = 0.12$ ). Across the three types of large gestures, there were no interaction effects, showing that Korean and Catalan speakers behaved similarly with respect to gesture size.

Since our data involves participants retelling the exact same narrative with the friend and with the superior, we are able to isolate specific gestures that occurred



**Figure 3.** Proportion of gestures that are large along the lateral axis (out of total number of gestures) for individual speakers; black lines represent participants who had less large gestures when speaking with the superior

in both retellings and compare them qualitatively. The examples in Figures 4 and 5 show participants performing the same gestures with the friend (on the left) and with the professor (on the right), but using larger gestures with the latter. In Figure 4, K1 uses a transversally large gesture that peaks beyond the shoulder with the friend, whereas the peak of the gesture is within the shoulder line with the superior. Note also two differences on the verbal level: the utterance with the superior contains the honorific ending *-yo* demarcating it as deferential speech. It is also in passive form ('he gets kicked out'). In Figure 5, C14 uses a large gesture on the sagittal plane which extends beyond her knees with the friend, but not with the superior. In the friend interaction, her whole body is also positioned further forward on the chair, with her torso leaning forward, thus decreasing the interactional space. In the examples, verbal content that was synchronized with the gesture is underlined.

### Two-handed gestures

Overall gesture counts aggregated across all speakers showed that Catalan speakers produced fewer two-handed gestures with the superior, whereas Korean speakers produced more. In Catalan, there were 364 two-handed gestures with the friend (48% of all gestures produced in this condition), compared to 313 with the superior (43%). For Korean, speakers produced 295 two-handed gestures with the friend (43%) and 265 with the superior (55%). Analysis of individual by-speaker

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Participant K1: The woman kicks Sylvester out the door

Friend



Superior



쫓아내

*ccochanay*

'[she] throws him out'

쫓겨나요

*ccochkyenayo*

'[he] gets kicked out'

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**Figure 4.** Using large transversal gesture with friend (video versions of all the examples in the paper are available from the authors on request)

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Participant C14: Event 11 (Tweety drops ball down drainpipe)

Friend



Superior



*el violín el que fa és tirar-li una bola de bolos*

'what Tweety does is throwing a bowling ball at him'

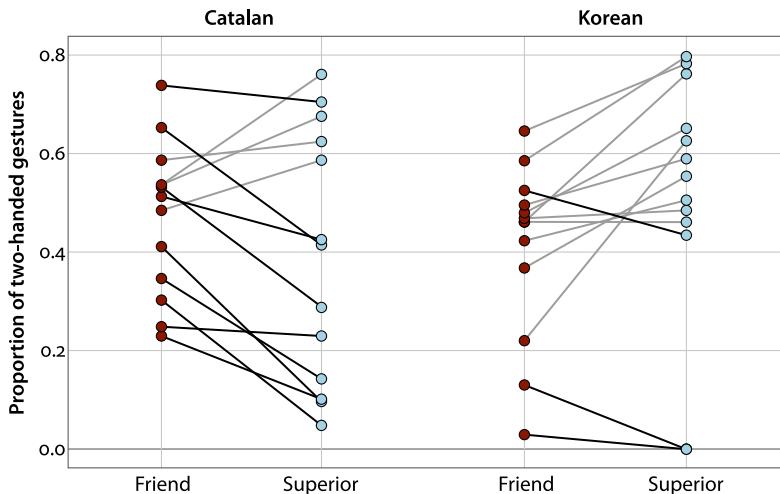
*i li tira una pilota de bolos*

'and he throws a bowling ball at him'

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**Figure 5.** Using large sagittal gesture with friend

results confirm this pattern. Twelve Catalan speakers produced fewer two-handed gestures in the superior context (controlling for overall gesture rates), and only two produced more. In contrast, only 6 Korean speakers produced fewer two-handed gestures, and 7 actually produced more. This suggests that the decreased use of two-handed gestures is consistent in Catalan. Figure 6 shows the use of two-handed gestures for individual speakers.



**Figure 6.** Proportion of two-handed gestures for Catalan and Korean speakers, separated by individual (each line); black lines represent participants who had fewer two-handed gestures when speaking with the superior

The fact that there is a distinct difference in the use of two-handed gestures between the two languages is confirmed by the Bayesian mixed logistic regression model. There is no main effect of Condition ( $-0.08$ , 95% CI  $[-0.51, 0.29]$ ,  $p_{\beta > 0} = 0.36$ ), but crucially, a positive interaction effect ( $+0.86$ , 95% CI  $[0.12, 1.63]$ ,  $p_{\beta < 0} = 0.01$ ), showing that Korean speakers produced relatively more two-handed gestures with the superior. In Figure 7, participant K10 is depicting Tweety dropping the bowling ball in the drainpipe. He performs the gesture with one hand with the friend, but with two hands with the superior. Also, note that the gesture peaks above head height with the friend, whereas this is not the case with the superior. In contrast, Figure 8 demonstrates the reverse pattern in Catalan: C12 uses a two-handed gesture with the friend, but a single-handed gesture with the superior.

Participant K10, Event 11 (Tweety drops ball down drainpipe)

Friend



Superior



볼링공을 그 위에다 넣어  
pollingkong-ul ku wi-eyta nehe  
'the bowling ball, [he] puts into  
the top'

그 고양이가 나오려는 입구에다가 던지니까  
*ku koyangi-ka nao-lye-nun ipkwu-eytaka tencinikka*  
'[he] throws [it] into the opening that the cat is going to  
come out of'

Figure 7. Using two-handed gesture with superior

Participant C12, Event 11 (Tweety drops ball down drainpipe)

Friend



Superior



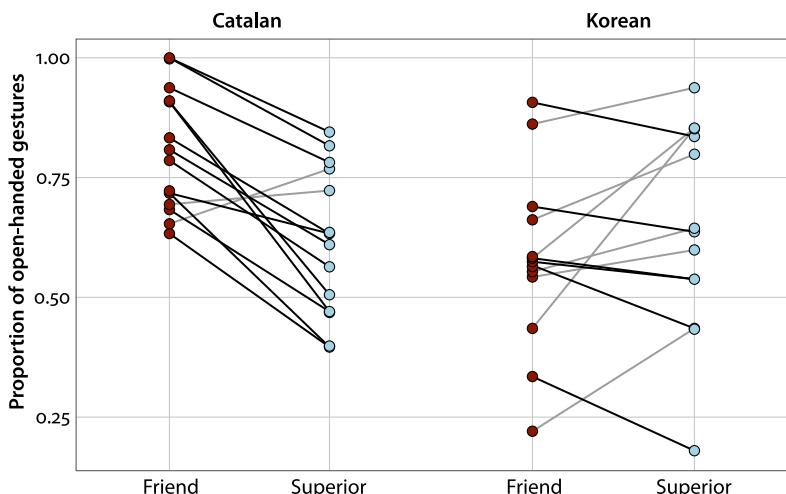
*la tira per la tuberia*  
'throws it down the drainpipe'

*El que fa és tirar-la per la tuberia*  
'What he does is to throw it down the drainpipe'

Figure 8. Using two-handed gesture with superior

## Hand configuration

Catalan speakers use more open-handed gestures with the friend and fewer with the superior, whereas Korean speakers did not. For Catalan, there was a total of 603 open-handed gestures in the friend condition (79% of total gestures in this condition), compared to only 453 with the superior (62%). For Korean, however, there was a total of 414 open-handed gestures with the friend (60%), compared to 332 with the superior (68.7%). A look at individual differences confirms this pattern: For Catalan, 12 speakers produced fewer open-handed gestures with the superior, and only 2 more. For Korean, only 6 speakers produced fewer open-handed gestures with the superior, and 7 more. Figure 9 shows the proportion of open-handed gestures for individual speakers.



**Figure 9.** Proportion of open-handed gestures for Catalan and Korean speakers; black lines represent participants who had a lower proportion of open-handed gestures when speaking with the superior

The Bayesian mixed logistic regression model indicated a reliable Condition effect ( $-0.38$ , 95% CI  $[-0.76, -.02]$ ,  $p_{\beta > 0} = 0.02$ ), as well as a reliable *positive* interaction ( $+1.39$ , 95% CI  $[0.67, 2.10]$ ,  $p_{\beta < 0} = 0.0$ ), indicating that the difference between conditions was less pronounced for Korean speakers.

Figure 10 shows an example of a Catalan participant modulating hand shape depending on the identity of the participant. When gesturing the motion of Tweety dropping a bowling ball down the drainpipe, participant C8 has the hands apart with the friend, but the fingers lightly interlocked with the superior.

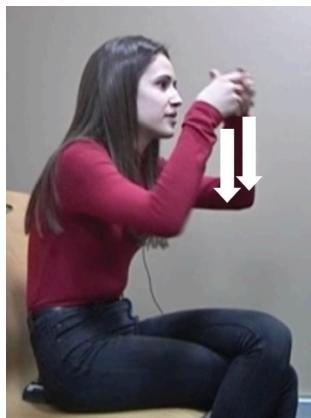
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Participant C8, Event 11 (Tweety drops ball down drainpipe)

Friend



Superior



*l'agafa i la fica per dintre de la canonada*    *la fica dins de la canonada*  
*'he grabs it and puts it inside the pipe'*    *'he puts it inside the pipe'*

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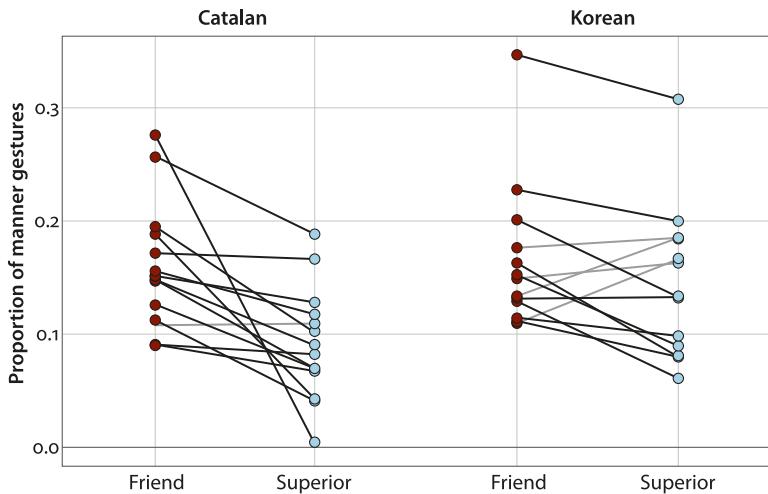
Figure 10. Using different hand configurations

#### PATH, MANNER and GROUND

Whereas the analysis of gesture frequency, size and hand configurations above considered all gestures produced, the analysis of PATH, MANNER and GROUND (current section) as well as viewpoint (following section) only considers the gestures used for representing 16 focal events (see Appendix). Consistent with the overall finding for Korean participants to reduce gesture frequency with the superior, the total number of gestures used by the Korean participants to mark these focal events decreased from 150 (mean=11.5 events for each participant) to 109 (mean=8.7). Catalan counts were more similar across the two interactions: 149 with friend (mean=10.6) and 138 with superior (mean=9.9). Overall, there were 425 PATH gestures (202 in Korean; 223 in Catalan), 342 MANNER gestures (168; 174), and only 119 GROUND gestures (48; 71).

For PATH encoding (controlling for overall gesture frequency), 9 Catalan speakers produce fewer gestures, and 5 more. For Korean speakers, the picture was similarly divided, with 5 speakers producing fewer PATH gestures, and 8 speakers producing more. This inconsistent picture is confirmed by the Bayesian logistic regression model, where for all fixed effects (including the interaction), 95% Bayesian credible intervals firmly include zero. Thus, there is no strong evidence for speakers modulating the number of PATH gestures.

In contrast, speakers tended to produce *fewer* MANNER gestures with the status superior. The individual difference analysis showed that, for Catalan, 13 out of 14 speakers produced *fewer* gestures in this condition, controlling for overall frequency. The picture was less pronounced for Korean, with 9 speakers producing *fewer* MANNER gestures, and 4 producing *more*. Figure 11 shows the proportion of MANNER gestures for individual speakers.



**Figure 11.** The proportion of MANNER gestures for individual Catalan and Korean speakers; black lines represent participants who had a lower proportion of MANNER gestures when speaking with the superior

When both languages are analyzed together, the strong difference in MANNER gestures for Catalan speakers is enough to lead to an overall Condition effect that is reliably different from zero ( $-0.32$ , 95%  $[-0.57, -0.07]$ ,  $p_{\beta > 0} = 0.006$ ), but only relatively weak evidence for an interaction between Condition and Language ( $+0.39$ , 95%  $[-0.10, 0.89]$ ,  $p_{\beta < 0} = 0.052$ ). Although this is consistent with the individual difference analysis, it suggests that there is insufficient evidence to conclude with certainty that Korean speakers do indeed modulate their MANNER gestures less than Catalan speakers do.

The differences in MANNER encoding are exemplified in Figure 12. C4 encodes PATH with a backhanded sweeping movement from left to right in both friend and superior conditions when describing Sylvester the cat rolling down the street with the bowling ball in his stomach. However, whereas with the friend he accompanies this sweeping motion with a twirl of the finger to mark the MANNER of the cat rolling, this part of the gestures is not replicated with the superior. The verbal content mentions the rolling (or “turning”) in both cases.

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Participant C4, Event 15 (Sylvester rolls down the street)

Friend



Superior



Surt, surt voltant

'he comes out, comes out turning around'

*i baixa rodolant, rodolant, rodolant*

'and he comes down rolling, rolling, rolling'

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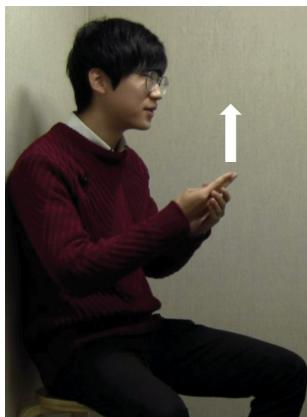
Figure 12. Encoding of MANNER

For GROUND, there is a tendency for speakers of both languages to produce fewer gestures when talking to the superior, but the overall picture is quite mixed. Individual speaker differences show that 8 Catalan speakers produced fewer GROUND gestures, 5 more, and 1 the same amount in the status superior context. 9 Korean speakers produced fewer, 2 more, and 2 the same. The Bayesian logistic regression model indicates no interaction whatsoever (95% CI firmly includes zero), and only very weak evidence for a main effect of Condition ( $-0.32$ , 95%  $[-0.77, -0.09]$ ,  $p_{\beta>0}=0.067$ ). This absence of strong evidence likely stems from the low overall number of GROUND gestures.

The tendency to curtail GROUND gestures with the superior is exemplified in Figure 13, where participant K11 encodes ground only when speaking with the friend (left). The clenched fist with the superior (right) seems to be a strategy for encoding interiority (i.e., *inside* the pipe) in the absence of GROUND. The pipe is mentioned in the lexical content in both versions.

Participant K11, Event 10 (Sylvester climbs up inside drainpipe)

Friend



Superior



파이프 관을 안으로 타고 들어가서 올라가는데

phaiphu kwan-ul an-ul tha-ko tule-ka-se olla-ka-nuntey

'[he] goes inside the pipe and goes up'

고양이가 배수관을 속으로 들어가서 그걸 타고 올라가는데

koyangi-ka payswukwan-ul sok-ul tuleka-se ku ke-ltha-ko olla-ka-nuntey

'the cat goes inside the pipe and goes up'

Figure 13. Encoding of GROUND

Although there is no strong evidence that participants modulated the frequency of PATH gestures (see above), we found one important qualitative difference in how it was encoded, chiefly in the Korean data. Namely, we identified a number of occurrences (12 in the Korean data, 3 in the Catalan data, all but one with the superior) when participants represented an event that occurred on the vertical plane with a transversal or sagittal gesture. In Figure 14, participant K2 uses a vertical downwards motion with the friend (left) to mark the PATH of the ball going down the drainpipe. But with the superior (right), his left hand moves transversally across to his right hand, which is marking GROUND (the pipe). In both versions, the verbal content makes reference to a dropping event, implying downward movement. Özyürek (2002) noted that speakers may modulate gesture plane depending on the relative seating position of the interlocutor, but the fact that social relationships may also influence gesture plane has not been mentioned. It's also notable that participant K2 uses an ideophone with a fortis consonant *ttak* with the friend, but the aspirated counterpart *thak* with the superior. Alternations in phonation are claimed to mark the level of intensity in Korean ideophones, with aspirated being less intense than fortis (Sohn, 2001, p.97).

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Participant K2, Event 11 (Tweety drops ball down drainpipe)

Friend



Superior



그래가지고 볼링공을 거기 딱 떨어트려

*kulaykaciko pollingkong-ul keki ttak ttelethulye*

'And with that (he) drops the bowling ball right in there'

볼링공을 배수관에 턱 떨어트려서

*pollingkong-ul payswukwan-ey ttak*

*ttelethulyese*

'(He) drops the bowling ball right in the drainpipe.'

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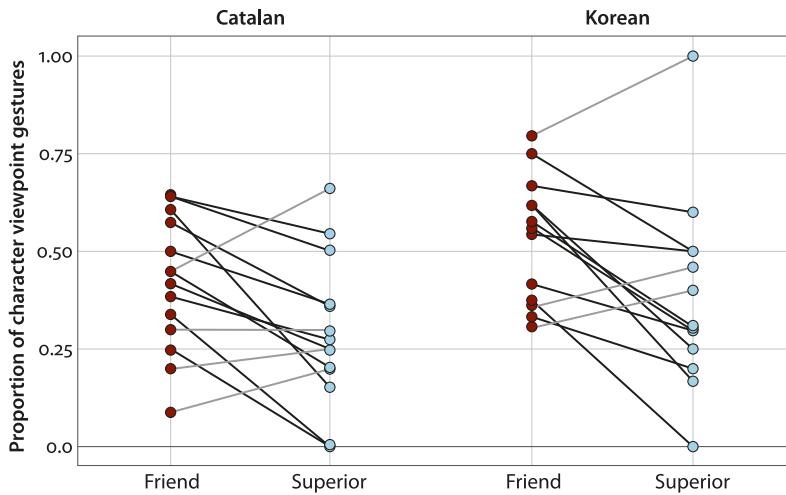
Figure 14. Representing a vertical PATH event on the transversal plane

### Viewpoint

There were a total of 199 character-viewpoint gestures (104 for Korean; 95 for Catalan), 300 observer viewpoint gestures (130; 170), and 47 dual viewpoint gestures (25; 22). In our analysis, we focus on the contrast between character versus observer viewpoint (ignoring dual viewpoint; i.e., gestures that combine character and observer viewpoint), as this contrast is more readily interpretable.

Speakers of both languages tend to produce fewer character viewpoint gestures when talking to a status superior. For Catalan, 10 speakers produced fewer character viewpoint gestures, and only 3 speakers produced more, with 1 speaker producing the same number. For Korean, 10 speakers produced fewer character viewpoint gestures, and only 3 speakers produced more (Figure 15).

A Bayesian logistic regression model indicated no strong evidence for an interaction (95% firmly centered at zero), but a reliable Condition effect ( $-0.60$ , 95%  $[-1.0, -0.2]$ ,  $p_{\beta > 0} = 0.001$ ), which suggests that for both languages, speakers produced fewer character viewpoint gestures (and thus proportionally more observer viewpoint gestures) when talking to a status superior.

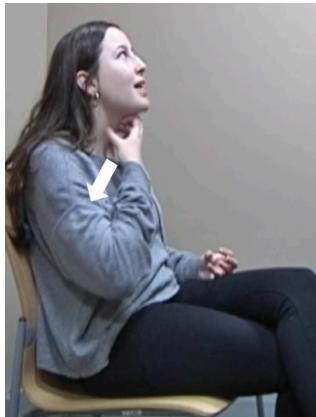


**Figure 15.** The proportion of character viewpoint gestures as opposed to observer viewpoint gestures for individual Catalan and Korean speakers; black lines represent participants who had a lower proportion of MANNER gestures when speaking with the superior

Examples of alternations between character and observer viewpoint are shown in Figures 16 and 17, with both of these examples relating to the part of the cartoon where Sylvester swallows a bowling ball. In Figure 16, participant C2 signals the swallowing motion as occurring into her own throat with the friend (left), meaning that this is a character-viewpoint gesture. With the superior, the gesture is performed merely with the hands: the motion of the bowling ball is depicted with the right hand, and the throat or body of the cat (GROUND) with the left hand (observer viewpoint). Similarly, in Figure 17, participant K1 uses character viewpoint with the friend: she is the cat, and the ball is inside her stomach. But with the superior, she adopts observer viewpoint: the ball is inside her hands, which represent the cat. The size of the ball is very large with the friend, and much smaller with the superior. The verbal content, however, is more descriptive with the superior.

Participant C2, Event 13 (Sylvester swallows the bowling ball)

Friend



Superior



*i ell se l'empassava*  
'and he swallowed it'

*i el Silvestre se l'empasse*  
'and Sylvester swallows it'

Figure 16. Viewpoint

Participant K1, Event 14 (Sylvester has the bowling ball in his stomach)

Friend



Superior



그래서 배가 이렇게  
kulayse pay-ka ilehkey  
'so [his] belly is like this'

그래서 이렇게 몸이 동그랗게, 볼링공처럼  
kulayse ilehkey mom-i tongkulah-key, pollinkong-chelem  
'so like this his body is round, like a bowling ball'

Figure 17. Viewpoint

## General discussion

We have found that speakers vary multiple aspects of gesture production according to social distance. Participants produced fewer gestures when interacting with the superior, and they also used fewer large gestures, fewer MANNER gestures (and somewhat fewer GROUND gestures), and fewer observer-oriented gestures (Table 2). With less frequent, smaller and less animated gestures being used towards the status superior, the general trend is for increased social distance to result in gesture curtailment.

**Table 2.** Summary of results in relation to status superiority  
(the long dash ‘–’ indicates lack of strong evidence for a preference)

	Korean	Catalan
Overall number of gestures	fewer	fewer
Large gestures: Vertical	–	–
Large gestures: Lateral	fewer	fewer
Large gestures: Sagittal	fewer (tendency)	fewer (tendency)
Two-handed gestures	more	fewer
Open-handed gestures	–	fewer
PATH gestures	–	–
MANNER gestures	fewer	fewer
GROUND gestures	fewer (tendency)	fewer (tendency)
Character viewpoint	fewer	fewer

Although both languages follow the general pattern of curtailing gesture when social distance is increased, some important cross-language differences emerged, including the curtailment of two-handed and open-handed gestures, which are known to appear perceptually larger (Woodin et al., 2020).

The fact that Catalan speakers also modulated their use of gestures according to the identity of the interlocutor suggests that social distance is important in this language, even in the absence of a grammatical system of honorifics and without any strong social ideologies of respecting seniors. This result actually somewhat mirrors the findings of studies that have compared sensitivity to social distance on the verbal level, such as Koo (1995) who found that American English speakers displayed similar sensitivity to social distance as Korean speakers. As discussed in Brown (2011, p.78), in “honorific languages” such as Korean the presence of grammatical honorifics and the pervasive social ideologies that surround them train

speakers to pay explicit attention to social distance, but this perception should not be confused with speakers actually being more sensitive to these factors in language production.

The preference for two-handed and open-handed gestures with the superior only for the Korean participants appears to be due to culture-specific associations between these gestures and ritualistic displays of respect towards elders. When Korean speakers pass an item to a status superior or receive an item from them, they perform these movements with two hands (L. Brown & Winter, 2019; Dennison & Bergen, 2010). Also, open-handed gestures are preferred when pointing to a status superior (L. Brown & Prieto, 2017). Our results suggest that these culture-specific preferences may carry over into other areas of gesture production. The fact that Korean participants prefer two-handed gestures with the superior whereas Catalan participants prefer one-handed gestures is therefore a difference that is rooted in cultural preferences regarding how politeness is performed. This is reminiscent of the finding in Nicoladis et al. (2018) that cross-cultural differences in gesture frequency in story-telling are rooted in cross-cultural differences regarding story-telling style, rather than merely being differences at the gestural level.

The curtailment of gesture frequency and MANNER gestures result in the iconicity of gesture being decreased when social distance is present, whereas the preference for smaller gestures and fewer character-viewpoint gestures mean that the gesturing style is less vivid and playful. These patterns fit in with observations that have been made about iconicity and playfulness more generally, and the contexts in which they occur. For instance, Dingemanse and Thompson (2020) found that people perceive iconic words (e.g., *zigzag*, *squeak*, *waddle*) as funnier and more playful. Similarly, we propose that more iconic gestures (e.g., a gesture showing the MANNER of a bowling ball rolling down the street) and other vivid gestures (e.g., a character-oriented gesture for swallowing a bowling ball) can appear playful or even comical due to the imagery conveyed in them. These kinds of gestures may be readily produced when talking casually with a friend, but may not be compatible with formal interactions with status superiors. The fact that gestures work together with ideophones to modulate expressivity was shown previously in Figure 14, where we see participant K2 using a more intense ideophone alongside a more vivid gesture. Dingemanse and Thompson (2020, p.218) talk of iconic words as “metacommunicative cues” that signal that a playful context is being evoked.

The view that features of language, including gestures, are markers of particular social contexts is consistent with the notion of social indexicality (Ochs, 1993;

Silverstein, 2003),<sup>3</sup> which is increasingly used in politeness research (Christie, 2018; Cook, 2008; Pizziconi & Christie, 2017). Social indexicality refers to the process by which semiotic forms “index” (or point to) social stances (Ochs, 1993; Silverstein, 2003). Silverstein (2003) sees indexicality as working on different levels: forms have first-order indexical meanings which consist of underlying social stances, which then lead to more specific second-order meanings depending on the context. For instance, Kiesling (2004) demonstrates how *dude* indexes a first-order stance of “cool solidarity”, and more specific second-order meanings including “slacker”, “skater”, and “druggie”. In studies of gesture, Lempert (2011) claims that Barack Obama’s precision point gestures index “making a sharp point” on the first order, which trigger the second order meaning of “being a sharp speaker” in certain contexts. Similarly, in the current study, gestures with heightened iconicity and/or vividness mark a first-order stance of “playfulness”. When used towards a friend, this sparks off second-order meanings related to friendliness and intimacy, but in other contexts it can also yield meanings related to being humorous or passionate. In contrast, when gestures are curtailed, a less playful and more somber context is evoked, which leads to second-order meanings related to being respectful, formal, calmer and so forth. This stance works well as an indexical marker for politeness since the speaker appears physically smaller and constrained, and thus less likely to be in a position to threaten the hearer (cf. the notion that certain forms of politeness involve redressing threats to the face of the interlocutor, P. Brown & Levinson, 1987). Using large gestures and body movements, on the other hand, is known to be a marker of power and status superiority (see L. Brown & Winter, 2019).

We believe that these differences in gesture production fit within a general picture of the multimodal indexing of politeness. When interacting with superiors, speakers do not only curtail gestures, but also other nonverbal cues that are associated with playful and intimate contexts such as haptics, adaptors, facial cues and slouched body positions (L. Brown & Winter, 2019; Hübscher, Sánchez-Conde, Borràs-Comes, Vincze, & Prieto, forthcoming). Indeed, the way that speakers adopt stiffer and less fluid body positions when interacting with superiors would make it more difficult for gestures to be produced freely (L. Brown & Winter, 2019). We also see deep connections between these gestural and nonverbal cues for politeness-related meanings with the vocal markers identified in previous research (Hübscher et al., 2017; Idemaru et al., 2019; Winter & Grawunder, 2012). Just as gestures are more constrained, the same can be said for polite acoustics in that speech addressed to a status superior is lower pitched, less noisy, clearer and less variable. Speakers avoid potentially playful vocal patterns, such as large pitch

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3. The concept of indexicality, as well as iconicity, has its origins in the work of Peirce (1940).

excursions, or loud voices, just as they avoid playful areas of gesture. Hübscher et al. (2017) refer to this more constrained way of talking as “prosodic mitigation”. In sum, constrained gestures are one of several multimodal cues for politeness and social distance.

Some limitations and unanswered questions remain. Although the current study used conversational data, this data was collected in a laboratory setting where participants were completing pre-determined tasks. This methodology allowed us to clearly separate two speaking styles, one which is more serious and one that is more playful. However, we expect that things may be more complex in real-world interaction. In some situations, speakers may be able to employ a mixture of cues that index a dynamic but deferential persona, or a calm but friendly persona, for instance. Future studies will need to look at how speakers utilize multimodal marking of politeness-related meanings in real-world interaction. Furthermore, although the current study established gestural differences between these two styles, it is unclear whether speakers rely on these gestural differences as cues that they are being spoken to in a distant or intimate way, or whether they rely on other verbal or nonverbal cues. Brown et al. (2014) and Idemaru et al. (2019) already established that acoustic cues play a role in how listeners distinguish deferential speech from non-deferential speech. Similar studies are now needed for gestural features.

## Conclusion

To date, work on audience or recipient design has shown that gesture is sensitive to quite general contextual factors, such as whether the interlocutor is visible, new to the activity or attentive to the speaker. In the current paper, we have advanced this area of research by showing that speakers design their gestures depending on social factors, namely the degree of social distance. Crucially, we have shown that these differences in gestural design are not limited to frequency, but occur in a holistic fashion across different parameters of gesture production. By curtailing gesture production in various ways, gestures become less iconic and less playful, and thus index a more serious stance that becomes a resource for marking social distance.

## Funding

This work was supported by the Core University Program for Korean Studies through the Ministry of Education of the Republic of Korea and Korean Studies Promotion Service of the Academy of Korean Studies (AKS-2017-OLU-2250002). Bodo Winter was supported by the UKRI Future Leaders Fellowship MR/T040505/1.

## Acknowledgements

The Catalan data collection costs and work were covered by the postdoctoral fellowship awarded to the third author by the URPP Language and Space. We are thankful to Grace Oh at Konkuk University for her immense assistance with the Korean data collection, and to Soyeon Kim who worked as an RA on the Korean data. We are grateful to Kaori Idemaru and Eric Pederson for their input at different stages of this project.

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## Appendix. Focal events from *Canary row*

1. Sylvester looks with binoculars
2. Tweety looks with binoculars
3. Sylvester enters building
4. The woman kicks Sylvester out the door
5. Tweety swings on perch while singing
6. Sylvester climbs up the outside of the drainpipe
7. Tweety flies out of the cage
8. Sylvester chases Tweety
9. Sylvester gets kicked out of the window
10. Sylvester goes up the inside of the drainpipe
11. Tweety drops a bowling ball down the drainpipe
12. The ball collides with Sylvester inside the drainpipe
13. Sylvester swallows the ball
14. The ball is inside Sylvester
15. Sylvester rolls down the street
16. Sylvester goes into bowling alley

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## Publication history

Date received: 3 December 2020

Date accepted: 14 August 2021

Published online: 10 January 2023