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Multimodal mitigation: how facial and body cues index politeness in Catalan requests

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Abstract: Recent cross-linguistic research has demonstrated that speakers use a prosodic mitigation strategy when addressing higher status interlocutors by talking more slowly, reducing the intensity and lowering the overall fundamental frequency (F0). Much less is known, however, about how politeness-related meaning is expressed multimodally (i.e., combining verbal and multimodal channels). The present study investigates how Catalan native speakers encode politeness-related meanings through facial and body cues. We test whether speakers apply a gestural mitigation strategy and use specific hedging devices in socially distant situations (e.g., when asking an older person of higher status for a favor). Twenty Catalan speakers were video-recorded while participating in a discourse elicitation task where they were required to produce requests in polite and non-polite contexts. In the resulting recordings, a set of 21 facial and body cues associated with speech were coded and analyzed. The results show that politeness-related meanings are expressed through gestural mitigation strategies that go hand-in-hand with previously reported prosodic mitigation strategies.

Keywords: Catalan; multimodal mitigation; multimodal politeness; requests

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1 Introduction

Politeness is a central feature of human communication, as it regulates social interaction, allows for smooth communication, and has the potential to prevent interpersonal conflicts (Brown 2001). Failure to adapt our communication in a way that is appropriate for a particular interlocutor can lead to misunderstandings and interactional difficulties, both within and across different cultural contexts. Here, we follow Brown's (2001) 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".

Given this broad definition, it is surprising that – at least until recently – research has mainly focused on verbal cues to politeness, neglecting the full array of body cues that also play an important role, as it can be easily illustrated. Take, for example, the context where a hotel employee invites hotel guests to help themselves at the lunch buffet. The verbal message "Please help yourself at the buffet" will elicit a rather different reaction depending on whether it is spoken in a pleasant tone and accompanied by a gentle palm-up offering gesture and friendly smile or delivered in a curt manner with a scowl and a brusque wave of the hand. The interpretation of this communicative act is likely to rely on all three factors: speaking tone, hand gesture, and facial expression. In the first combination of multimodal cues described, the hotel employee is likely to be perceived as polite while his/her delivery in the second case will be perceived as rude.

Over the last decade, there has been a gradual but constant increase in the amount of research showing that politeness-related meanings such as social distance are indexed in a multimodal fashion. Here we will use the term multimodal politeness to refer to this holistic approach to analyzing politeness, which moves away from a main focus on verbal cues (see Brown and Prieto 2017 for a review). Especially with regard to prosodic cues, several studies involving different languages have demonstrated that speakers systematically modulate their prosody in accordance with the relative social status of an interlocutor (e.g., Brown et al. 2014; Brown and Prieto 2017; Culpeper 2011; McKinnon and Prieto 2014; Winter and Grawunder 2012; and many others). However, with regard to multimodal cues, the research is still sparce.

The main goal of the present study is to add to our knowledge of multimodal politeness by investigating how Catalan speakers index politeness in the way they modulate their facial and body cues, alongside previously analyzed prosodic, lexical, and morphosyntactic markers. The novelty of this paper lies in its

quantitative analysis of a comprehensive set of facial and body cues in the expression of politeness, something which to the best of our knowledge has so far only been addressed by Brown and Winter for Korean (2018). In comparison to Winter and Brown's study (which analyzed interactions from Korean televised dramas), the present study investigates elicited data in a typologically different language (Catalan) using an oral discourse completion task. Crucially, this type of elicitation task allows the researcher to control not only the type of speech act elicited (i.e., requests), but also a pragmatic factor, social distance, which influences the production of the requests. For this purpose, we follow Leech (2014: 126) in using the general term "social distance" to comprise 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). Importantly, research has shown that social distance is closely connected to the indexing of politeness-related social meanings (see Goldsmith 2007: 227 for an overview). In comparison to Korean, studied in Brown and Winter (2019), Catalan does not explicitly index social distance through the overt use of grammaticalized honorific marking, but differences between politeness registers are marked by a set of well-known morphosyntactic and lexical features, which differ along a number of dimensions (see Payrató and Cots 2011), as well as prosodic strategies, which have also been shown to be systematically employed (Hübscher et al. 2017). We surmise that the patterns of multimodal behavior displayed by speakers in polite settings will show a "gestural mitigation strategy" (i.e., a display of fewer facial and body cues) which will mirror the patterns of prosodic mitigation observed in previous studies across several languages (see, e.g., Grawunder et al. 2014, for Korean; Hübscher et al. 2017, for Catalan; Idemaru et al. 2019, for Japanese; Winter and Grawunder 2012, for Korean). In the following sections, we first give an overview of the politeness and mitigation strategies found in speech acts of request, we then summarize the current state of research on the prosody-politeness interface, and we finally review the rather limited literature on multimodal politeness.

2 Background

2.1 Politeness and mitigation devices

Since requests are face-threatening acts (Brown and Levinson 1987), mitigation devices have often been studied in this context, and one way in which politeness can be evoked is by mitigating the potential threat. Following Caffi (2007), mitigation is a cover term used for a set of strategies which are devised to soften,

attenuate, or alleviate different aspects of a person's speech. Such mitigation strategies involve the use of not only lexical and morphosyntactic but also prosodic and gestural markers.

According to the pragmatics literature, mitigation strategies can modify a speech act either internally or externally (Blum-Kulka et al. 1989). External modification affects not the utterance as such but rather the context in which that particular speech act occurs. This type of mitigation is carried out through various supportive moves or devices. For example, in the case of a request to borrow someone's car, the request proper ("Could I borrow your car?") might be preceded (or followed) by an alerter ("Maria"), a preparator ("last week my car broke down"), and an expression of anticipatory gratitude ("I would be very grateful"). Internal modifications, on the other hand, help to downgrade the force of the potentially negative effect (Faerch and Kasper 1989; House and Kasper 1981). This type of mitigation can be encoded lexically through politeness markers – such as, in English, the word *please,* mental state verbs such as *think*, or modal adverbs such as *maybe*, *probably*, etc. – or syntactically through conditional or interrogative sentence structure. The softening and downgrading of the negative effects of face-threatening speech acts is the main function of mitigation (Caffi 1999; Fraser 1990). Interestingly, as Blum-Kulka et al. (1989) contend that both external and internal modifiers are context-specific and therefore not inherently polite (contrary to Brown and Levinson's [1987] theory, which treated mitigation as a synonym for politeness).

In connection with the verbal expression of politeness in Catalan, Hübscher et al. (2017) showed (like Payrató and Cots 2011) that the informal/intimate pronoun *tu* 'you' was used more frequently in conditions where politeness was not required, whereas the more formal/polite pronoun *vosté* 'you' was more frequent in situations requiring politeness. Informal requests also showed a greater use of imperatives and the indicative mood, whereas formal requests were characterized by an increased use of indirect interrogatives. However, as will be seen in the following subsection, more recent studies (as well as Hübscher et al. 2017, itself) have shown that mitigation is also expressed in Catalan through prosody.

2.2 The prosody-politeness interface: prosodic mitigation strategies

Pitch, as one crucial element of prosody, has different functions in speech, and one of them is to signal social and affective functions such as dominance, certainty and importantly for the present research, politeness (see e.g., Culpeper et al. 2003).

The close nature of the relationship between politeness and prosody was first set out by Ohala (1984) in his *Frequency Code Hypothesis*, according to which politeness is universally associated across languages with higher pitch. Though some studies have found confirmation of this hypothesis (Chen et al. 2004; Herraiz and Serena 2014; Orozco 2010; Tsuji 2004), another strand of research has shown that in some languages, such as Korean (Winter and Grawunder 2012), Japanese (Idemaru et al. 2019), German (Grawunder et al. 2014) and Catalan (Hübscher et al. 2017), an overall lower pitch marks politeness-related meanings. These last four studies all used an oral discourse completion task to elicit requests in socially distant contexts (e.g., requesting something from a boss or professor) and socially close contexts (e.g., asking a friend for a favor). Audio recordings of participant responses were then analyzed in terms of: fundamental frequency, duration, intensity (loudness), and voice quality. Across the four studies, in the polite condition the speech rate decreased, there were more hesitations, syllables were longer, intensity decreased, and jitter and shimmer decreased, while the difference in amplitude between first and second harmonics (H1–H2) increased. Regarding F0, the polite condition was characterized by lower pitch values, thus contradicting Ohala's *Frequency Code Hypothesis* for these languages (at least in the sorts of contexts where there is an asymmetrical power relationship like worker-to-boss or student-to-professor, as also demonstrated in Winter et al. (2021).

While the above-mentioned studies have focused on the speaker, it is also important to investigate the effects that the speaker's prosody has on the interlocutor's perception. The latter was the focus of Brown et al. (2014), who investigated whether native speakers of Korean could detect the formality level of Korean utterances without any explicit verbal markers, and whether American English listeners without any knowledge of Korean could do the same. The stimuli consisted of identical requests read out loud in both honorific (*contaymal*) and non-honorific (*panmal*) registers by eight native Korean speakers. The results showed that when listeners had to detect which request was polite and which one informal, both natives and foreigners were able to distinguish between the two registers purely on the basis of the varying phonetic cues pertaining to these two different conditions.

Regardless of whether it confirms or refutes the Frequency Code Hypothesis, this evidence from production and perception studies shows that prosody must be included among the mitigation strategies characterizing socially distant speech addressed to superiors. The question we will ask in this paper is whether multimodal cues also play a role in mitigation. In the following section we review the current state of the art on the relationship between multimodal cues and politeness.

2.3 Multimodal expression of politeness: gesture mitigation strategies?

Over the last few years there has been growing recognition that multimodal cues play a role in the expression of politeness-related meanings. For example, Kita's (2009) review of gesture research includes a section which describes how rudeness can be conveyed in many European and American cultures with specific gestures such as extending the middle finger. Indeed, in most cultures, particular gestures are regarded as impolite because of their cultural significance (Kita and Essegbey 2001). For example, pointing with the left hand is considered rude in Ghana and thus avoided in a communicative interchange such as giving route directions. While gesture studies have often focused on the use of manual gestures without taking into account other facial and bodily cues, studies from the field of social psychology – as pointed out by Brown and Winter (2019) – have dealt extensively with a variety of facial and bodily markers of politeness-related phenomena, focusing on psychological notions such as power, status, and intimacy (i.e., social distance). Power refers to the perceived dominance dynamic between speaker and hearer, whereas status refers to one's positioning in a particular social hierarchy (Ellyson and Dovidio 1985). Though there seems to be no one-to-one match between psychological constructs and the different categories used in politeness research, some key factors have been analyzed in relation to the communication of politeness. Power in particular has been found to be a reliable predictor of politeness-related behavior (Goldsmith 2007: 227). It has been found that power is expressed through a range of multimodal behaviors implying strength or fearlessness, while submissiveness is expressed by means of behaviors implying weakness, tension, and fearfulness (Brown and Winter 2019; Mehrabian 1981). Visual cues associated with submissiveness or uncertainty/hedging, seen as any sort of self-withdrawal or personal submission to the hearer, are central in the dialectic expression of power and humility with respect to the higher-ranking person. Previous studies have shown that speakers of lower status express submissiveness by adopting rigid postures with their head in a downturned position or by leaning forward (Brown and Winter 2019; Harper 1985) and maintaining a direct body orientation facing the interlocutor (Brown and Winter 2019; Burgoon and Saine 1978; Jorgenson 1975; Mehrabian 1968). These expressions of submissiveness constitute what Trees and Manusov (1998) call *mitigating nonverbal behavior*. These authors describe various such behaviors used by English-speaking Americans to express politeness, including touching, close proximity to the interlocutor, direct body orientation, pleasant facial expressions, raised eyebrows, a softer voice, and a tense and closed

position with tight, small gestures. In contrast, *aggravating nonverbal behavior*, used to display impoliteness, includes no touching, greater distance from the interlocutor, indirect body orientation, unpleasant facial expressions, furrowed eyebrows, a loud voice, and wide gestures. Mitigation is thus a multimodal phenomenon where speakers make use of both body/face/voice and words to lessen their degree of imposition on the listener.

Unsurprisingly, studies in the field of linguistics have traditionally focused predominantly on the lexical and morpho-syntactic devices speakers have at their disposal to reduce their level of commitment or imposition on the hearer. Hedging devices are typically one of these strategies. Hedges are both cautious and interactive devices which allow the construction of a relationship between the speaker/writer and listener/reader by moderating the degree of certainty or imposition with which they present their knowledge claims or requests. Hence, hedging devices have been exhaustively analyzed in scientific writing, but due to their capacity to reduce imposition on the listener, they have recently also received attention in the politeness literature. As a matter of fact, using hedges helps speakers to save face by giving the impression that they are not strongly committed to a proposition, hence softening the degree of imposition on the hearer.

It is thus of interest to analyze markers of low commitment (i.e., uncertainty) – both body/face/voice signals and lexical and morphosyntactic hedging – as potential politeness markers. In other words, if lexical and morphosyntactic hedges can serve as devices to simultaneously convey low commitment/uncertainty and politeness, we must assume that the same body signals that communicate uncertainty can also convey politeness. In this case, the speaker's goal is not to lower his or her level of commitment to his statements, but to lower the degree of imposition on the addressee. For instance, the verbal marker "I don't know" can function as a marker of uncertainty/lack of knowledge, but it can also convey a lowering of the speaker's level of imposition on the hearer. On the multimodal plane, the shoulder shrug can serve the same dual functions. It can convey either lack of knowledge/uncertainty or lack of imposition on the interlocutor. This overlap between signals communicating lack of knowledge/uncertainty and lack of imposition suggest that we should encounter multimodal signals of uncertainty like shoulder shrugs in situations that require politeness. Following Givens (2002) and also Swerts and Krahmer (2005), we would also expect to find other facial and bodily markers of uncertainty such as head shakes and tilts, frowns and pouted or pursed lips.

In the present study we hypothesize that these low commitment gestural strategies can be regarded as mitigating devices that will occur more frequently

in polite conditions, together with a less frequent use of body and facial cues. To our knowledge, only one previous study has investigated multimodal politeness, in this case in Korean. Brown and Winter (2019) found that specific multimodal cues were used in deferential situations, together with a reduction in the magnitude of facial and bodily cues. The study analyzed gestural behavior in two different but related relational practices: "doing deference" when interacting with a status superior, and "doing intimacy" when interacting with a status equal. They analyzed 154 interactions from Korean televised dramas which contained both types of situations. Their results showed that the participants displayed significantly different behaviors in the two practices. When "doing deference" with a status superior, inferiors displayed erect but constrained body positions, used a direct bodily orientation, and used fewer manual gestures, fewer raised and furrowed eyebrows or adaptors (self-touches) and fewer haptics (i.e., touching the interlocutor). When "doing deference" there was also a decrease in animatedness and freedom of movement as compared to when "doing intimacy". Interestingly, the authors also found that head nods and smiles were equally used when performing intimacy and when performing deference. So far little is known about how such multimodal patterns behave in typologically different languages.

2.4 The present study: research questions and hypotheses

As mentioned above, recent research on Catalan has shown that when addressing a person of higher status, not only the verbal domain but also the acoustic/prosodic domain is adapted, through the use of prosodic mitigation strategies (Hübscher et al. 2017). However, very little is known as yet about how multimodal cues work together to convey politeness in socially distant encounters in this language or more generally in Romance languages. In order to be able to provide a comprehensive picture of Catalan speakers' politeness-related behaviors, in this paper we provide a multimodal analysis of Catalan requests by analyzing in a quantitative way a wide array of body and facial gestural patterns during not only the head act (i.e., the actual request) but also the preparatory and post-request stages. We will contrast the behaviors produced by participants in two simulated conditions: a "polite" condition, in which they imagine they are addressing a much older professor, and a "non-polite" condition, in which the imagined interlocutor is a similarly-aged friend (It should be noted that we use the labels "polite" and "non-polite" here for convenience and are not to be understood as direct interpretations of how the two levels of speech

are to be interpreted in context). Importantly, the use of an oral discourse completion task will allow us to manipulate social distance as an experimental variable control of social distance.

First, we will test whether Catalan speakers combine gestural mitigation strategies with the prosodic mitigation strategies reported by Hübscher et al. (2017) for the same database (decreases in speech rate, intensity, or pitch values). Our hypothesis is that Catalan speakers will display a behavior similar to that shown by Korean speakers and adopt a gestural mitigation strategy consisting of a reduction in the number of facial and bodily cues (Brown and Winter 2019). In our view, gesture suppression is a form of gestural mitigation since the production of fewer facial and body movements is a reflection of more restricted and less animated behavior.

Second, we will analyze how the use of body cues indicating speaker's level of commitment (such as shoulder shrugs, eyebrow frowning, etc.) or submission (such as smiling, raised eyebrows, etc.) varies according to the social distance between interlocutors. Similar to Trees and Manusov's (1998) study, we hypothesize that Catalan speakers will use a greater number of body cues associated with uncertainty/submissiveness when addressing a person who is socially distant to them as compared to a friend to whom they feel close.

3 Methodology

3.1 Participants

Twenty female Catalan-dominant speakers (mean age = 21.00, SD = 3.72) participated in the experiment. Only females were invited to participate in order to obtain a more homogeneous sample. All of them were students at the Universitat Pompeu Fabra in Barcelona and reported Catalan to be their dominant language relative to Spanish (mean percentage of Catalan daily usage = 75.83%, SD = 13.62%). Participants received a small payment for participating in the experiment.

3.2 Materials

As noted above, the speech act under study was the request. In order to elicit requests, we used the same oral Discourse Completion Task (DCT). DCTs present the

participants with the written description of a situation which is intended to trigger a response while at the same time controlling for different contextual variables (Billmyer and Varghese 2000; Blum-Kulka et al. 1989; Félix-Brasdefer 2010; Vanrell et al. 2018). Also, since we were interested in comparing our results to previous studies on politeness and prosody in Korean, German, Catalan, and Japanese (Grawunder et al. 2014; Hübscher et al. 2017; Idemaru et al. 2019; Winter and Grawunder 2012), we chose to make use of the same methodology as that used in those experiments.

The DCT consisted of 12 discourse contexts, six in the polite condition and six in the non-polite condition, which were created in order to elicit requests (see Table 1 for an example). To be able to obtain comparable data sets across the two conditions, we controlled for the cost of the action requested, but varied the pragmatic factor (social distance) in the two conditions: in other words, requests addressed to an intimate represented less (–) social distance and requests addressed to a much older status superior represented greater (+) social distance. Furthermore, in the descriptions of the contexts it was made clear that the interlocutors were female in all cases. The complete set of discourse contexts is shown in the Appendix. Each discourse prompt was printed on a card and accompanied by a photo illustrating the situation described.

Table 1: Examples of contextual prompts in Catalan intended to elicit requests, one polite (left) and the other non-polite (right), taken from the DCT. English translations are provided below each example.

Polite	Non-polite
Treballes en una empresa. La setmana passada, la teva cap (que és cap de secció i té uns 50 anys) et va demanar que escrivissis un PPT per a una presentació que tenia dimecres de la setmana vinent. El termini per lliurar-lo és avui a la nit (divendres) et sembla que necessitaràs uns dies més. Com li sol·licitaries al teu cap una extensió del termini? English translation: 'You work in a company. Last week your 50-year-old boss asked you to prepare a PPT for a presentation that she will have to give on Wednesday next week. The deadline is tonight (Friday) and you fear that you won't manage to finish it by tonight. How do you ask your boss for an extension of the deadline?'	*A causa d'una grip estomacal, vas faltar a la darrera classe d'història de divendres passat, en què estàs matriculat. Així que decideixes demanar prestats els apunts a la teva companya de classe, per posar-te al dia amb la resta de classe. Què li diries, a la teva amiga, perquè et deixés els apunts de la classe que et vas perdre?* English translation: 'Because of the stomach flu, you were absent last Friday from the history class that you are enrolled in. So you decide to borrow your classmate's notes to catch up with the rest of the class. What would you say to get this friend to lend you her/his notes for the class you missed?'

3.3 Procedure

The DCT task was video-recorded at the Linguistics Laboratory at the Department of Translation and Language Sciences of the Universitat Pompeu Fabra in Barcelona, Catalonia. Participants were invited to read the instructions and then were given the 12 cards containing the contextual prompts and accompanying photos, with the six non-polite situations being given first (to avoid eventual layover effects from the polite condition on the non-polite condition) in random order and then the six polite situations (also in random order) coming after.

After reading each card, the students were asked to place it face down on the table and then to produce a request as spontaneously as possible while facing the video camera (a Panasonic 3MOS HD-AVCCAM). Participants also wore a clip-on microphone. The sound sample rate was 44.100 Hz with 16-bit quantization.

A total of 239 audio-visually recorded requests (6 situations × 20 participants × 2 conditions) were obtained. In one case, one of the 12 situations was accidentally overlooked. The total duration of the requests amounted to 3 h, 31 min and 8 s of recorded speech. The dataset obtained was the same as that analyzed in Hübscher et al. (2017), the difference being that in that case only the audio tracks of the recorded requests were analyzed for prosodic content, whereas here we looked at both audio and visual tracks to analyze gestural as well as verbal behaviors.

3.4 Multimodal labeling

The 238 target requests were labeled for multimodal behavior by the second author using ELAN version 4.9.4 (Lausberg and Sloetjes 2009) (see Table 2). Importantly, the multimodal behavior was labeled for both the head act as well as the modification devices. In order to create a comprehensive profile of politeness-related multimodal behaviors, we assessed an extensive range of categories identified in previous studies, following especially the coding system proposed in Brown and Winter (2019). Apart from that, our coding system was primarily based on the MUMIN (Multimodal Interfaces) scheme developed by Allwood et al. (2007). For those facial gestural cues that are not included in the MUMIN, we used elements from the FACS (Facial Action Coding System) by Ekman et al. (2002), and for certain body postures we used the Body Action and Posture Coding System (BAP) by Dael et al. (2012). More specifically, we took note of facial and body cues which have been reported in previous studies as interacting with mitigation behavior, power, and submission. By the same token, we paid

Table 2: Annotated facial and body cues.

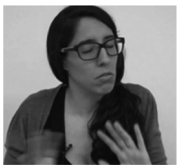
#	Tier	Gesture	Example	Description
1	Head	Down		Movement of the head downwards.
		Forward		Movement of the head forward.
		Nod		Down-up head movement once or twice in close succession.
		Shake		Repeated rotation of the head from side to side.
		Tilt		Tilting movement of the head to one side or from side to side.
		Turn		Rotation of the head toward the left or right side.
2	Eyebrows	Furrowed		Eyebrows lowered and drawn together, leading to vertical wrinkles between the eyebrows and possibly one or more horizontal wrinkles just under the nose.

Table 2: (continued)

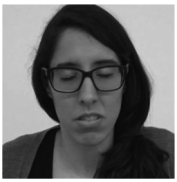
#	Tier	Gesture	Example	Description
		Raised		Eyebrows pulled upwards, resulting in an arched, curved shape.
3	Eyelids	Closed		Closing of the eyes longer than a blink.
		Squinted		Eyelids tightened and the eye aperture is narrowed. The lower lid is raised so it covers more of the eyeball than usually.
4	Mouth + Nose	Smile		Lip corners pulled up towards the cheek bone in an oblique direction.
		Lip corners down		The corners of the lips are drawn down.
		Horizontally stretched lips		Movement of the lips horizontally.
		Pressed lips		The upper lip and the lower lip press against each other.

Table 2: (continued)

#	Tier	Gesture	Example	Description
		Nose wrinkle		The skin along the sides of the nose is pulled upwards towards the root of the nose, causing wrinkles to appear along the sides of the nose and just under the nose.
5	Shoulders	Symmetric shoulder shrug		Both shoulders move upward at the same time.
		Asymmetric shoulder shrug		One shoulder moves upward.
		Slumped shoulders		Shoulders shrug and move forward.
6	Trunk	Forward		Movement of the trunk forward.
		Lateral leaning		Movement of the trunk to on one side or from side to side.
		Side rotation		Rotation of the trunk toward the left or right side.

special attention to body postures which have been documented to arise in states of speaker submission and speaker uncertainty.

Facial and bodily cues were annotated in ELAN 4. 9. 4 in accordance with Allwood et al. (2007) and Dael et al. (2012). Table 2 illustrates a total of 21 distinct facial and bodily cues which were coded in ELAN as separate tiers.[1]

3.5 Statistical analyses

For statistical analyses, we used IBM SPSS v24. First, we were interested in whether the discourses produced during the two conditions differed in length. To determine whether any difference in durations would be statistically relevant, a Generalized Linear Mixed Model (GLMM) was run in which this variable was set as the dependent variable (Gamma distribution, Log link), with Condition (polite vs. non-polite) as a fixed factor. Concerning random factors, the model included a random slope for Condition by Subject, and a random intercept for Item. Indeed, Condition yielded a significant result, F (1, 236) = 68.109, β = −0.509, SE = 0.062, p < 0.001, indicating that discourses in the polite condition were longer than in the non-polite one. Because of this, for each recorded discourse, we calculated the number of instances of every type of visual cue, which was then divided by the duration of the discourse in seconds.

A main GLMM was carried out to compare whether the 21 labeled visual cues occurred in different amounts in the two conditions. As noted above, since the discourses in the two conditions differed in discourse length, the dependent variable was the number of visual cue occurrences per second (Gamma distribution, Log link). The fixed factors were Condition (polite, non-polite), Visual Cue (21 different facial and bodily cues in total; see Table 2), and their paired interaction. A random slope was set for both Condition and Visual Cue by Subject. Consequently, in this model, the main effect of Condition would inform us about significant differences in the number of visual cues produced across conditions, taking into account individual variation and the different visual cues that have been labeled. The interaction Condition × Visual Cue would indicate, in turn, whether each gesture label is more frequently present in one condition compared to the other.

1 The annotation of multimodal behaviors was carried out in two stages, with the following procedure: First, an annotation of 4 entire requests (in both conditions, approx. 10 min of speech) was carried out by the second author. The coding was then checked by the first and third author and ambiguous cases and cases where there was disagreement were discussed and criteria for the coding categories were then refined where necessary. After that, the second author coded the rest of the data.

4 Results

The results of the main GLMM analysis revealed that all fixed factors were significant. First, the main effect of Condition, F (1, 942) = 24.585, $p < 0.001$, indicated that fewer facial and bodily cues per second were found in polite encounters ($\beta = -0.029$, $p < 0.001$). Second, the main effect of Visual Cue across both conditions, F (20, 942) = 4.915, $p < 0.001$, indicated that, taking into account the whole data set, the number of Raised Eyebrows and Head Turns per second was greater than numbers of five other visual cues (Head Nods, Asymmetric Shoulder Shrugs, Trunk Lateral Leanings, Smiles, and Closed Eyelids). On the other hand, the number of Raised Eyebrows (but not Head Turns) per second was also greater than the number of seven other specific visual cues (Head Forward, Head Shake, Head Tilt, Symmetric Shoulder Shrug, Trunk Forward, Trunk Side Rotation, Lip Corners Down).

Finally, a significant interaction between Condition × Visual Cue was obtained (F (19, 942) = 1.960, $p = 0.008$). In order to explore the contribution of each specific visual cue to the differences in frequency found between conditions, a series of pairwise comparisons were calculated (one comparison per label, taking Condition as the contrast field; sequential Bonferroni correction applied in the analyses). The results of these contrasts are presented in Table 3, together with the mean visual cue tokens per second found for each visual cue.

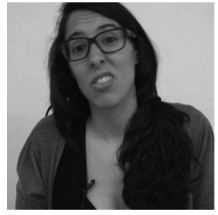
All in all, the results reveal that socially close encounters display a greater number of visual cues per second, especially for eight specific cues: Head Down, Head Shake, Head Turn, Asymmetric Shoulder Shrug, Squinted Eyelids, Furrowed Eyebrows, Smile, and Lip Corners Down. Table 4 visually illustrates the above-mentioned results through a sequence of screenshots of the target visual cues displayed by one participant in the non-polite and polite condition, respectively.

The non-verbal behavior in the socially close environment is visible thanks to the use of several elements, namely the smile, the direct way of addressing the friend (*hey, listen!*), and the humorous grimace at the end of the request. Her initial smile (picture 1) when calling her friend's name rapidly transforms into a feigned grimace of pain (picture 2) when she anticipates the unpleasantness of having to ask her friend a favor. In picture 3, she uses her head to perform a pointing gesture towards her right, as if to say "Come on, let's go (and I'll show you what I need you to do for me)", whereas when mentioning the text in Portuguese, her vigorous headshake (picture 4) precedes the verbal message ("I don't understand it"). Finally, she concludes her turn by making a humorous grimace meant to make her friend give in to the request (picture 5). The grimace

Table 3: Means and SE for the number of specific visual cue tokens per second obtained in the two conditions. The last four columns show the results of the simple contrasts from the interaction Social Distance × Visual Cue, namely contrast estimate (*Est.*), standard error (*SE*), t-test results (*t*), and adjusted significance (*p*).

Articulator	Label	Non-polite		Polite		GLMM contrasts			
		M	SE	*M*	SE	Est.	SE	*t*	*p*
Head	Down	0.151	0.025	0.080	0.013	–0.071	0.022	3.244	0.001
	Forward	0.079	0.015	0.073	0.012	–0.007	0.014	0.461	0.645
	Nod	0.078	0.015	0.066	0.010	–0.012	0.015	0.815	0.415
	Shake	0.110	0.016	0.070	0.010	–0.040	0.014	2.870	0.004
	Tilt	0.093	0.012	0.082	0.010	–0.011	0.010	1.071	0.284
	Turn	0.151	0.018	0.096	0.011	–0.055	0.014	3.917	0.000
Eyebrows	Furrowed	0.122	0.019	0.072	0.012	–0.049	0.016	3.040	0.002
	Raised	0.162	0.021	0.141	0.017	–0.021	0.016	1.281	0.200
Eyelids	Closed	0.066	0.013	0.065	0.014	–0.001	0.015	0.036	0.971
	Squinted	0.130	0.020	0.091	0.014	–0.039	0.018	2.218	0.027
Mouth and nose	Smile	0.103	0.014	0.053	0.008	–0.050	0.012	4.046	0.000
	Lip corners down	0.091	0.026	0.031	0.017	–0.060	0.029	2.041	0.042
	Horizontally stretched lips	–	–	0.052	0.029	–	–	–	–
	Pressed lips	0.085	0.034	0.065	0.017	–0.020	0.036	0.553	0.581
	Nose wrinkle	0.104	0.023	0.066	0.017	–0.039	0.025	1.572	0.116
Shoulders	Asymmetric shrug	0.092	0.015	0.061	0.009	–0.031	0.014	2.134	0.033
	Slumped	0.103	0.020	0.085	0.013	–0.018	0.018	1.013	0.311
	Symmetric shrug	0.096	0.015	0.075	0.011	–0.021	0.014	1.554	0.121
Trunk	Forward	0.070	0.012	0.079	0.013	0.009	0.012	–0.787	0.432
	Lateral leaning	0.077	0.014	0.059	0.009	–0.018	0.013	1.415	0.157
	Side rotation	0.090	0.014	0.069	0.010	–0.021	0.013	1.674	0.094

Table 4: Request in non-polite condition.

				
Favela	*ey escolta!*	*No podries ajudar-me un moment*	*amb un text en português*	*que no acabo d'entendre ?*
'Favela	hey, listen!	Could you help me (a moment)	with a text in Portuguese	that I don't understand?'
Smile	Nasolabial furrow deepened, raised eyebrows, squinted eyelids	Deictic head gesture	Furrowed eyebrows, squinted eyelids, headshake	Raised eyebrows, grimace with open mouth, and stretched lip corners

communicates a sense of acknowledged guilt (either for not being able to understand the text in Portuguese, or for having to bother the friend in asking for her help). In line with the proverb "a fault confessed is half redressed", the speaker assumes that the very fact of acknowledging her guilt makes the "bad deed" half forgiven, so she expects to have convinced her friend to collaborate.

By contrast, in the socially distant context (see Table 5) the same speaker first clears her throat ("Ahem"), and then greets her superior with "Hi, Sheila", which, though seemingly informal, is more formal than the previous salutation ("Hey, Favela").

Overall, her face and body behavior throughout the speech act is more restrained than in the socially distant context, except for a head bow that she performs while she salutes.

5 Discussion and conclusions

The present analysis has revealed differences between the patterns of multimodal behavior associated with two different politeness conditions in Catalan. Our results showed that when Catalan speakers responded to discourse prompts in which they had to perform a request to a superior, they adapted their facial and body cues accordingly.

In relation to our first hypothesis related to the use of a *multimodal mitigation strategy* in terms of the amount of gesturing used, the analysis of the number of visual cue tokens per second revealed that fewer facial and body cues overall were employed in the polite condition (when talking with a superior) than in the non-polite condition. Thus, in the non-polite condition speakers seemed to express themselves more freely than in the polite condition, where body and facial cues were less frequent and more constrained and controlled. Interestingly, our results align with the findings by Brown and Winter (2019), who analyzed a typologically different language, Korean. They too found that there were fewer raised and furrowed eyebrows, fewer adaptors, and additionally also fewer manual gestures in the deferential condition than in the more intimate condition. Similar to our study, head nods were not employed differently across conditions, suggesting that these gestures might be rapport devices which are employed independently of the level of politeness.

Interestingly, the gestural mitigation strategy found in our Catalan data matches previous results found in the same database at the prosodic, lexical, and morphosyntactic levels. Hübscher et al.'s (2017) prosodic analyses revealed a "prosodic mitigation strategy" in the polite conditions where subjects exhibited a slower speech rate, a lower mean pitch, less intensity, less shimmer and jitter,

Table 5: Request in polite condition.

				
Ehm 'Ahem …	*Hola, Sheila* Hi, Sheila Head bow	*Que podries si us plau* Could you please Head tilt	*ajudar-me* help me Raised eyebrows	*amb tot el process?* with the whole process?'

and an increase in H1–H2. In this sense, the way in which the multimodal behavior is constrained during formal interactions somewhat mirrors the way in which prosody is also constrained, which lends support to the claim that "gestural mitigation" strategies are used in socially distant contexts in combination with the "prosodic mitigation strategies" identified in Hübscher et al. (2017). The integration of gestural and prosodic patterns seen in our data expand and support recent claims that prosody and gesture act as sister systems from a sociopragmatic point of view (see Brown and Prieto 2021).

Our second hypothesis, that some multimodal markers signaling uncertainty and also speaker lack of imposition would be more present in the polite condition did not play out. Surprisingly, cues which have been described as indexing submissiveness or uncertainty such as raised eyebrows, shoulder shrugs, and squinted eyelids were not found in the present study to occur more frequently in the polite condition. Taking a more detailed look at the different facial and body cues used across conditions, eight facial and body cues were produced significantly more often in the non-polite condition, namely head down, head shake, head turn, asymmetric shoulder shrug, squinted eyelids, furrowed, and lip corners down. All these gestures have been previously related to the multimodal expression of uncertainty (Givens 2002; Swerts and Krahmer 2005). Surprisingly, those cues that have typically been associated in the literature with having a mitigating value (see e.g., Trees and Manusov 1998), were those that appeared significantly less in the polite condition. As we already mentioned, such signals (the shoulder shrug, for instance) can bear a double meaning, communicating both uncertainty/lack of knowledge and lack of imposition, while their actual meaning is disambiguated by the hearer thanks to the context and the speaker's other body signals. However, this ambiguity may be the explanation for our disconfirmed hypothesis regarding the presence of mitigating body signals in the polite context. Speakers may not have wanted to perform such signals of uncertainty/lack of knowledge in a superior status context, and hence constrained any body behavior which could have called their expertise into doubt.

Interestingly, the presence of all other visual cues was not different across conditions. Overall, thus, the results show that multimodal polite behavior is more related to a generalized gesture mitigation strategy that also constrains the multimodal behavior of submissiveness.

We would like to entertain another set of possible explanations for the lack of gestural submissiveness in our polite condition, which could be tested by future research. In the present study we took a holistic approach to the analysis of requests, meaning that we included participants' full answers in our analysis. Apart from the head act (= main request), the participants' answers typically

included different pragmatic strategies such as an attention-getter/alerter or supportive move before and/or after the main request (Blum-Kulka et al. 1989). What we do not know is whether a significant difference in the use of the remaining cues could be found in the actual head act. Returning to the classic distinction between external and internal mitigation strategies outlined in the introduction, internal mitigation devices are those used to downgrade the potential negative effects of a speech act. Research into such devices has tended to be limited to looking at lexical and morphosyntactic markers occurring in the head act. While in this paper and also in Hübscher et al. (2017) a holistic approach to prosodic and also facial and body cues was taken, it could be that when producing the actual request, participants displayed a more marked behavior, which might manifest itself as an even more controlled use of facial and also a more controlled use of body cues or the use of certain gestural uncertainty markers, parallel to the lexical and morphosyntactic mitigation devices encountered in socially distant encounters.

Another possible explanation is that in the context of contemporary Catalan culture, there is an increasing tendency to play down the social distance between professor and students, and this trend has affected the multimodal expression of politeness in the sense that fewer hedging and submissiveness markers are used, at least in university contexts. This issue will need to be assessed in future research. However, the overall picture is clear enough, namely that participants used fewer facial and body cues, including the uncertainty and submissiveness facial and body cues when talking to a status superior, which goes hand in hand with the findings for prosody. Thus, when looking at the request speech act from a perspective that includes preparatory and post-strategies, the overall trend found in Catalan formal speech is clearly to suppress facial and body movement overall.

All in all, we claim that the multimodal behavior described in our data constitutes a *mitigated multimodal polite speech style* and shows how speakers carefully adapt their requests depending on their conversational partner. In face-to-face-interaction, the expression of politeness-related meanings is accomplished through a variety of articulators and modalities, involving lexical hedges and morphosyntactic strategies, as well as different prosodic markers and different multimodal strategies. In order to convey politeness, all of these different articulators need to be coordinated, since otherwise an utterance can be perceived as inappropriate. While on the verbal side mitigating lexical cues (hedges) are employed, recent analyses of prosodic and multimodal cues from a crosslinguistic perspective have provided converging evidence of clear strategies to express politeness-related meanings by displaying a more subdued and

mitigated prosodic style (Grawunder et al. 2014; Hübscher et al. 2017; Idemaru et al. 2019; Winter and Grawunder 2012), quantitatively fewer and more constrained facial and body cues (Brown and Winter 2019), and more constrained use of gestures (Brown et al. forthcoming).

In general, the current results add to a growing body of research which examines language in its entirety by assessing in an integrated fashion not only the prosody but also the gestures, facial expressions, and body movements which accompany linguistic expression (see e.g., Perniss 2018). For example, elements in the vocal modality which traditionally were not regarded as linguistic such as clicks and percussives (Ogden 2013; Wright 2011) and "filled pauses" like *uh* and *um* (Clark and Fox Tree 2002) have been found to encode discursive and interactional functions, and similarly research on various multimodal meanings which are employed very systematically in interaction has advanced rapidly. Also, evidence from linguistic processing has shown that in face-to-face interaction language is processed by integrating multiple articulators and modalities, and that people are actually faster at processing more signals simultaneously than speech alone (see Holler and Levinson 2019 for a review). Interlocutors thus encode and decode meanings through a plethora of cues which are signaled through various channels simultaneously, and future research will therefore need to address multidimensional analyses of communicative cues. In the future it might be of interest to investigate the extent to which different facial and body cues are combined and the relative effect and weight they have on the perception of politeness.

Further research will also need to confirm the validity of the crosslinguistic tendency to mitigate prosody as well as visual and body cues in polite speech. In general, a multimodal approach needs to be applied much more broadly now to the analysis of different speech acts, speech situations, and gender effects, and crucially it needs to be studied in more interactive settings. Another step forward will also be to observe how manual gestures and body movements are shaped in the interactional space and the degree to which they are adapted depending on the interlocutor. Furthermore, taking a cross-cultural perspective will allow us to better understand which cues are shared and which ones are assigned different meanings across cultures and more specifically whether prosodic and gestural mitigation is a generally shared strategy when interacting with status superiors in different cultures.

Finally, this study points to the need for research of a more applied nature. Having an awareness of how different speech styles function in different cultures might help prevent potential misunderstandings in social interactions such as business meetings, for example, and also crucially should be taken on board in second language classrooms. Furthermore, our results provide data that will

prove useful in the development of naturalistic virtual agents that can model language accurately in terms of multimodal features, whether acoustic, verbal, or gestural. All in all, we believe that adopting a fully multimodal approach is a promising direction for the investigation of politeness-related meanings which merits a more prominent place in future research.

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Appendix

1. DCT English version

	POLITE	NON-POLITE
C	Imagine that you are walking down the corridor at your office and run into your 50-year-old boss. You'd like some clarification from her about something you are working on and would therefore like to set up a meeting with her tomorrow at 2 PM in her office. Greet her, explain the situation, and find out if she'd be available at that time.	Imagine you walk down the corridor at university and run into a classmate with whom you are working on a class project. This classmate wasn't in class yesterday when the professor told you that she wanted to meet with the two of you to talk about your work and asked whether you would be available on. Wednesday at 10.30. Greet your classmate, tell her about the situation and ask her if the hour proposed by the professor suits her.
1	You are applying for a scholarship and decide to ask your professor, who has gotten to know you well as your academic advisor, to write a recommendation letter for you. What would you say to get your professor to do this favour for you?	Your laptop has a problem. You go and see a friend who is really good with computers and ask her if she could take a look at your laptop.

(continued)

	POLITE	NON-POLITE
2	You work for a company. Last week your boss asked you to put together a PPT for a presentation that she has to give on Wednesday next week. The deadline is tonight (Friday) and you fear that you won't manage to finish it by tonight. How do you ask your boss for an extension of the deadline?	Because of the stomach flu, you were absent from last Friday's history class that you are enrolled in. So you decide to borrow notes taken by a classmate, who is a close friend, to catch up with the rest of the class. What do you say to get this friend to lend you her notes?
3	You are applying for a teaching assistant job in England between doing your Bachelor's and Master's degrees, and you need a letter of reference from your tutor, a 50-year-old full professor. What do you say to him/her?	You are studying Portuguese. Your mastery of it is still quite limited and you have a short text in Portuguese which is important for you to understand. Ask your friend whether she could translate it for you.
4	You've just heard that one of your best friends is going to get married in Sweden in three months' time. Of course you would like to attend the wedding but since it takes place on a Thursday you would need to take at least two days off work to fly there and attend the wedding ceremony and party. You go to see your boss at work and ask whether it would be possible for you to take those two or three days off work.	Your computer is out of order because it has been infected by a virus, but you have an important paper due tomorrow. You decide to ask your room mate whether you can borrow her computer tonight. What do you say to get your roommate to do this favour for you?
5	You have to hand in a term paper in a couple of days and you urgently need a particular book which you can't find in the library because someone else has already borrowed it some time ago. You know that your 50-year-old professor has a copy somewhere and since you would really like to consult this book you go and ask her whether you can borrow the book.	Today you have a test about a novel at 11 am. It is 10 am and you are at a bar with friends and you see that your friend has brought along the novel. Ask your friend if you could browse through the book briefly to review before the exam.

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