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Demonstratives in Spanish–Catalan simultaneous bilinguals: which system do they prefer?

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Abstract

Demonstratives are cross-linguistically widespread deictic expressions. Demonstrative systems exhibit variation in number of terms, and parameters affecting their usage. The present paper assesses the relationship between spatial deixis and bilingualism: how language dominance affects speakers of two languages with different demonstrative systems. Here, we compare the use of demonstratives by 72 European Spanish-Catalan simultaneous bilinguals in Mallorca to 30 European Spanish monolinguals. Our results confirmed a significant effect of physical distance between speaker and referent on demonstrative choice in both languages, and differences between languages in the use of the middle term. We did not find the expected effect of language dominance in simultaneous bilinguals. Moreover, we found no influence of the hearer's position on demonstrative choice in monolinguals or bilinguals in European Spanish or Majorcan Catalan. In view of our results, the present study contributes to the debate on how bilingual speakers employ different deictic expressions.

1. Introduction

Deixis is a communicative strategy, cross-linguistically widespread, with demonstratives being its most common form. Demonstratives (*this/that* in English)[1] are often used for tying a clause to its surrounding setting (or context) and for drawing the attention of the interlocutor to an intended referent (Cornish, 2011; Diessel, 1999; Talmy, 2018).

54.40% of the world's languages have two-term demonstrative systems, like English (*this/that*); while 37.40% employ three demonstrative terms, like European Spanish (*este/ese/aquel*: *this/that/that*), or Catalan (*aquest/aqueix/aquell*: *this/that/that;* Diessel, 1999, 2005; Todisco et al., 2021).[2] Generally, the speaker is considered to be the ORIGO (Bühler, 1934), or the principal deictic centre from whom deictic projection originates. In two-term systems, the deictic terms tend to convey a proximal/distal opposition with respect to the speaker and hearer. For example, the English proximal[3] form *this* refers to a referent closer to the speaker (or hearer), while the distal form *that* refers to a referent at a middle/far distance from the speaker (and hearer). In three-term systems, the information conveyed by the proximal and distal terms is the same as in two-term languages, with the proximal term used for closer referents and the distal term used for further referents. Additional terms can convey middle distance information between the referent and the speaker and hearer, or indicate that a referent is closer to the hearer, if the speaker and hearer are spatially misaligned (Casanova, 1993; Coventry et al., 2008; Jungbluth, 2003, 2005; Rubio-Fernandez, 2022). As we discuss below, there is still some debate regarding the extent to which European Spanish demonstratives are affected by the relative positions of speaker and hearer, but the proximal form *este* (*this*) is nevertheless usually taken to refer to a referent close to the speaker, the medial form *ese* (*that*) to a referent at a middle distance from the speaker (or closer to the hearer), while the distal form *aquel* (*that*) refers to a referent at a further distance from the speaker (and hearer).

European Spanish and Catalan both have a three-term system, but the frequency of use of their middle terms differs across the two languages. European Spanish preserves a stable use of the middle term *ese* (*that*), whereas the use of the Catalan middle term *aqueix* (*that*) varies according to the geographical origin of the speakers (Todisco et al., 2022). This substantial difference suggests that Peninsular Catalan speakers are less conservative than Balearic speakers

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in the number of terms in use. Indeed, Peninsular Catalan speakers actually show a strong tendency towards a two-term system (*aquest/aquell*; Alomar & Melià, 1999; Brucart, 2002; Nogué-Serrano, 2015); while Balearic Catalan speakers still tend to maintain the three-term system (*aquest/aqueix/aquell*; Todisco et al., 2021, 2022), but with a reduced frequency of use of the middle term *aqueix* (*that*).[4] For example, Todisco et al. (2021) found that Balearic Catalan speakers use all three terms when communicating spatial location, with *aqueix* (*that*) used to convey middle distance, but at low frequencies, with no influence of the position of the hearer during testing. Recent studies have explained the reduction as an internal process of symmetry and equilibrium (i.e., diachronic change in Rubio-Fernandez, 2022; and analogical levelling in Todisco et al., 2021); nevertheless, the reasons for maintaining the middle term *aqueix* (*that*) in Balearic Catalan are still under investigation. Overall, the residual use of the middle term *aqueix* (*that*) speaks in favour of a progressive disappearance of the term.

Given the supposed differences in how terms may be used between languages (see section 2 for a more detailed discussion about European Spanish and Catalan), this raises the question whether bilingualism might play a role in the use of demonstratives.

Due to the copresence of the two grammatical systems, studies on bilingualism indicate the simultaneous activation of two languages during comprehension and production (Costa & Sebastián-Gallés, 2014; Kroll et al., 2014). Bilingual language production depends on several factors, among which the age of acquisition and the degree of dominance in two or more languages are particularly important (e.g., Abutalebi & Green, 2008; Cook, 2003; Costa & Sebastián-Gallés, 2014; Kroll et al., 2014). While the age of acquisition is a fixed measure, dominance can increase or decrease across the lifespan depending on language use (Birdsong, 2014; Dussias & Sagarra, 2007; Köpke & Genevska-Hanke, 2018; Kreiner & Degani, 2015; Llisterri, 2019; Pallier, 2007). Exposure to, and use of, a second language strongly influences the degree of dominance in the two languages, which can often lead to an interlinguistic influence (i.e., transfer) – that is, the effect of one language on the other (Cadierno, 2020; Ortega, 2008; Vulchanova et al., 2022b).

Studies with sequential bilinguals, or adult learners of a second language, show a general tendency over time for a reduction from more complex to less complex linguistic structures (Coventry et al., 2011; Dabrowska, 2018; Dussias & Sagarra, 2007; Geeslin & Guijarro-Fuentes, 2005, 2006; Grosjean, 1989; Kroll & Bialystok, 2013; Thomason, 2008). For example, Spanish sequential bilingual speakers living in Norway showed a reduction from a three-term to a two-term demonstrative system over time, under the pressure of Norwegian exposure (Vulchanova et al., 2020).

However, the effect of language dominance on demonstrative usage in simultaneous bilingual speakers – who have learned the two languages from birth – has not been fully investigated (cf. Rubio-Fernandez, 2022, discussed in section 2 below). Here, we study the case of European Spanish–Majorcan Catalan simultaneous bilinguals to assess whether being dominant in European Spanish, a language with a stable three-term system, increases the use of the medial term *aqueix* (*that*) in bilingual Catalan speakers, relative to speakers who are dominant in Catalan. Specifically, the goal of the present study was to investigate (a) whether the degree of dominance in one language or the other plays a role in the number of terms and/or parameters used; and (b) focusing on the position of the hearer, to further examine differences between European Spanish and Majorcan Catalan and to contribute to the ongoing debate on the parameters affecting the usage of demonstratives during interaction.

We predicted (a) an effect of language dominance on the use of demonstratives. If this holds true, we expected to see an intrusion effect of the more dominant language on the less dominant one in the number of demonstrative terms and/or parameters used (i.e., we expected that a European Spanish dominant bilingual speaker would preserve a three-term system of demonstratives in both European Spanish and in Majorcan Catalan). Moreover, we did not predict (b) any influence of the position of the hearer in Majorcan Catalan but expected to find such an effect in European Spanish, in line with Coventry et al. (2008) and Rubio-Fernandez (2022). In accordance with Rubio-Fernandez (2022), and the reduced sensitivity to hearer's position that she found in European Spanish–Catalan bilinguals influenced by the distance-oriented demonstrative system of Catalan, we also investigated whether being dominant in European Spanish transfers a greater sensitivity to the position of the hearer in Majorcan Catalan, whose system of demonstratives has not been found to be sensitive to this parameter.

The remainder of the paper is structured as follows: we begin with a detailed overview of the European Spanish and Majorcan Catalan demonstrative systems and the parameters affecting their use (section 2). We then present our study in the remaining sections (sections 3-7): a psycholinguistic elicitation task employing the 'memory game' paradigm (originally developed by Coventry et al., 2008).

2. Languages and parameters

2. 1. European Spanish

European Spanish has a three-term system: *este* (*this*) / *ese* (*that*) / *aquel* (*that*). According to Hottenroth (1982), the speaker is the only deictic centre (or ORIGO, Bühler, 1934). The ad/pronominal form *este* (*this*), thus, identifies a space proximal to the speaker; *ese* (*that*) a medial distance from the speaker (with no reference to the hearer) and *aquel* (*that*) a space far from the speaker, with recent evidence suggesting that the distal term (*aquel, that*) is used less frequently than the proximal and medial terms in both adult and child speech (Guijarro-Fuentes et al., 2022a). Given the ongoing debate on whether or not the position of hearer affects the speaker's choice of one demonstrative form on another, other studies have studied the relative positions of speaker and hearer during interaction, with somewhat mixed results (Coventry et al., 2008; Gómez Sánchez & Jungbluth, 2015; Jungbluth, 2003, 2005; Rubio-Fernandez, 2022; Shin et al., 2020; Woensdregt et al., 2022).

The effect of the speaker and hearer's position in European Spanish demonstrative choice has been addressed in several studies. Coventry et al. (2008) investigated the effect of the position of the hearer, manipulating the position of the hearer either seated beside or opposite the speaker, during a memory game for object location task. They found that speakers tend to use the proximal form *este* (*this*) for a referent in their own peri-personal space (a space a speaker can physically act upon), but also seem to partition space into the experimenter's space and the speaker's space when the speaker and experimenter are opposite each other, with changes in the use of the proximal term *este* (*this*) as a function of seating position.

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These results have been confirmed and extended by Rubio-Fernandez (2022) and Woensdregt et al. (2022). Rubio-Fernandez (2022) presented an online demonstrative-choice task, whose cover story is that the participant is moving house and asks a friend to help him/her pack stuff in boxes. Participants were asked to complete the request reported in a speech bubble (i.e., 'Now I need…') by clicking on one of three radio buttons – one per each demonstrative form. The target object was indicated by the orientation of the bodies of the speaker and hearer and by two dashed white lines representing the gaze of the speaker. Rubio-Fernandez (2022) found that Spanish monolingual speakers were sensitive to distance of the object from the speaker and to the hearer's position. The choice of the middle term *ese* (*that*) for middle distance revealed an interaction between the object and the position of the hearer. Moreover, the position of the hearer showed a stronger effect when participants were choosing between the medial and distal forms (i.e., *ese* vs. *aquel*) with respect to proximal and medial forms (i.e., *este* vs. *ese*). Finally, the position of the hearer also had a significant effect in the increased use of the distal form *aquel* (*that*) when the target object was far from both speaker and hearer. Rubio-Fernandez's (2022) findings have been confirmed using computational models assessing the pragmatic and socio-cognitive dimension of demonstrative use (Woensdregt et al., 2022). According to this crosslinguistic study, languages with a three-term demonstrative system – such as European Spanish – are sensitive to the hearer's focus of attention during interaction.

The results of Coventry et al. (2008), Rubio-Fernandez (2022) and Woensdregt et al.'s (2022) deviate from an earlier suggestion by Jungbluth (2003, 2005) that face-to-face interaction is associated with a more "sociocentric" use of the proximal term at any location between the speaker and hearer (i.e., shared space) and are more in line with a person-centred approach to demonstratives. Rubio-Fernandez (2022) argues that this discrepancy might be due to the use of the proximal demonstrative as a conversational filler during the conversational setting used by Jungbluth (2003, 2005). However, a recent study by Coventry et al. (2023) did not find an effect of the position of the hearer on demonstrative choice, failing to replicate the earlier results of Coventry et al. (2008). Coventry et al. (2023) argue that demonstratives might function in a similar manner to the so-called "projective" spatial adpositions (*to the left of*; *in front of*, etc.) where there are individual differences in the choice of spatial reference frame speakers for these terms (e.g., my left or your left; see Tosi et al., 2020; Tversky & Hard, 2009). So, rather than being obligatory in a language to use terms in a person-centred manner, there may well be individual differences in demonstrative choice that may account for different findings across studies.

Despite the extensive research on the parameters affecting European monolingual Spanish speakers, only a few studies have focused on the influence that bilingualism might have on demonstrative usage (e.g., Rubio-Fernandez, 2022; Vulchanova et al., 2020, 2022a). Considering the effect of exposure to a second language in sequential bilinguals, Vulchanova et al. (2020, 2022a) examined the intrusion effect of the two-term demonstrative system of Norwegian on the three-term system of Spanish, using the memory game for object location (Coventry et al., 2008). Sequential bilinguals living in Norway showed a reduction in their native language demonstrative system due to the interference of the language of exposure. In addition, the cross-linguistic study by Rubio-Fernandez (2022) on the socio-cognitive demand expressed by demonstrative use via the abovementioned online demonstrative choice task also focuses on bilinguals. In this case, the European Spanish–Catalan sample comprised bilingual speakers who learned Catalan before the age of 12. Results highlight that the distance-oriented feature of the Catalan demonstrative system (see section below) interfered with the Spanish performance of the same sample, which showed a reduced use of the second term *ese* (*that*) and a reduced sensitivity to hearer's position when performing in European Spanish.

Altogether, these results suggest that European Spanish has a multi-term demonstrative system characterized by both distance- and person- oriented parameters during semi-controlled and semi-naturalistic interactions. Taking the other person's perspective may be optional rather than obligatory, and characterized by a frame of reference that changes in accordance with the communicative intent and scenario (Coventry et al., 2023).

2. 2. Catalan

Catalan[5] generally employs a two-term demonstrative system [*aquest* (*this*) / *aquell* (*that*)] (Brucart, 2002; Nogué-Serrano, 2015; Rubio-Fernandez, 2022; Vann, 1995), but there is some geographical variation (i.e., in some regions [e.g., la Franja, Balearic Islands] the three-term system *aquest/aqueix/aquell* is still used; Institut d'Estudis Catalans, 2016; Saragossà, 2004; Todisco et al., 2021, 2022).[6]

Given the variation in the Catalan system in the number of terms in usage, recent studies have investigated whether specific Catalan-speaking areas – mainly Peninsular and Balearic Catalan – present a three-term (*aquest/aqueix/aquell*) or a two-term (*aquest/aquell*) system of demonstratives, either within or outside the context of interaction (Rubio-Fernandez, 2022; Todisco et al., 2021, 2022). In Todisco et al. (2021), a group of 36 simultaneous European Spanish–Majorcan Catalan bilinguals participated in a memory game task to elicit demonstratives (Coventry et al., 2008; Gudde et al., 2018) and were instructed to use three demonstratives *aquest/aqueix/aquell* to remember the location of an object. Results showed that the medial term *aqueix* (*that*) was infrequently used to convey distance compared to *aquest* (*this*) and *aquell* (*that*; *aquest* = 49.83%; *aqueix* = 7.94%; *aquell* = 42.22%). Furthermore, there was no effect of the position of the hearer in the case of the dual opposition (a result also found by Rubio-Fernandez, 2022 using a different methodology). This indicates a progressive reduction, which is leading to a two-term system (*aquest/aquell*), in line with the already stable two-term locative adverbial system (*aquí/allí*, *here/there*). Such findings have been explained in line with analogical levelling – an internal process of language change based on regularity (i.e., analogy) and symmetry (i.e., levelling) in word forms (Strik, 2015; Todisco et al., 2021).

As stated so far, the usage of demonstratives is influenced by a series of perceptual and conceptual parameters, as well as by the number of demonstrative terms, but we note some variation between studies and geographical regions in how demonstratives are used. In light of the above considerations, no study has yet focused on the adaptive nature of language systems in simultaneous bilinguals during interaction, when immersed in an environment characterised by a constant language contact, such as European Spanish and Catalan in Mallorca (cf. Rubio-Fernandez, 2022; Vulchanova et al., 2020). The present study aimed to address this issue.

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3. The present study

In the present study, we aimed to shed light on the impact of language dominance on the use of demonstratives in simultaneous bilingual speakers. First, (a) we analysed whether the degree of dominance in one or the other language plays a role in the number of terms and/or parameters used; and then (b) we focused on the position of the hearer during the interaction to contribute to the ongoing debate on the parameters that influence the usage of demonstratives in the two languages under investigation. We addressed the difference between the two languages using the memory game paradigm (Coventry et al., 2008; Gudde et al., 2018), an elicitation task that allowed us to manipulate the position of the interlocutor/hearer.

To recap the hypotheses, we expected that (a), being dominant in one of the two languages influences the use of demonstratives in the less dominant language. This influence may lead to a change in the number of terms and parameters. We also hypothesised that (b) both languages would be affected by physical distance between speaker and referent, but we expected only European Spanish speakers to be also influenced by the position of the hearer (see Coventry et al., 2008; Jungbluth, 2003, 2005; Rubio-Fernandez, 2022 for European Spanish; and Todisco et al., 2021 for Majorcan Catalan).

4. Method

We used the memory game paradigm (Coventry et al., 2008, 2014; Gudde et al., 2018), a controlled psycholinguistic experiment, to elicit spatial language production, with speakers of European Spanish and Majorcan Catalan.

4. 1. Participants

A group of 72 simultaneous bilinguals (students from the University of Balearic Islands in Mallorca) participated in the experiment for course credit. Participants (M_{age} = 21.8; SD = 2.42; 55 females), reported that they acquired both Spanish and Catalan by three years of age (Klein et al., 2014; Kroll et al., 2014; Werker & Byers-Heinlein, 2008). We used the Bilingual Language Profile test (BLP, Birdsong et al., 2012) to assess the degree of language dominance of the participants. The BLP indicates dominance in either language on the extreme on a scale from -218 to +218. We included this score as a continuous variable in our analysis.

A monolingual group of 30 students (M_{age} = 23.5; SD = 5.88; 18 females), from the University of Valladolid voluntarily took part in the experiment as the European Spanish monolingual control group.

All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All participants signed a consent form before commencing the experiment.

4. 2. Procedure and design

As previously stated, the memory game task is a controlled method to elicit the production of demonstratives (see Gudde et al., 2018 for a detailed description of the methodology). Participants were told they were taking part in a study on the effects of language on memory for object location, and they were assigned to the language condition, to ensure they were unaware that their demonstrative production was being tested. Participants were seated at a long table (320cm * 80cm, see Figure 1), where 12 color-coded locations (of which 6 were used) marked different distances in front of the participant. The six locations made up three regions. The first two locations (25cm and 50cm) corresponded to the participants' peri-personal space (Region 1); the space within their reach. Region 2 (at 150 and 175cm) was at the middle of the table, out of reach for both participant and hearer in any condition, and Region 3 (at 275 and 300cm) was furthest from the participant, but within reach of the hearer when seated opposite. There were two positions of the hearer: either beside (therefore sharing the same perspective as the participant) or at the far end of the table opposite the participant.

At the beginning of each trial, the experimenter placed a disk with a coloured shape on it (e.g., black cross) at one of the locations. After placing the disk, the experimenter sat either side-by-side or facing/opposite the participant and asked the participant to memorize the position of the disk (Figure 2). To do so, participants had to point at the referent, without leaning on the table or touching the disk, and verbally refer to the disk by using a three-constituent noun phrase: [demonstrative] + [colour of the image] + [name of the image], e.g., "*This blue heart*"

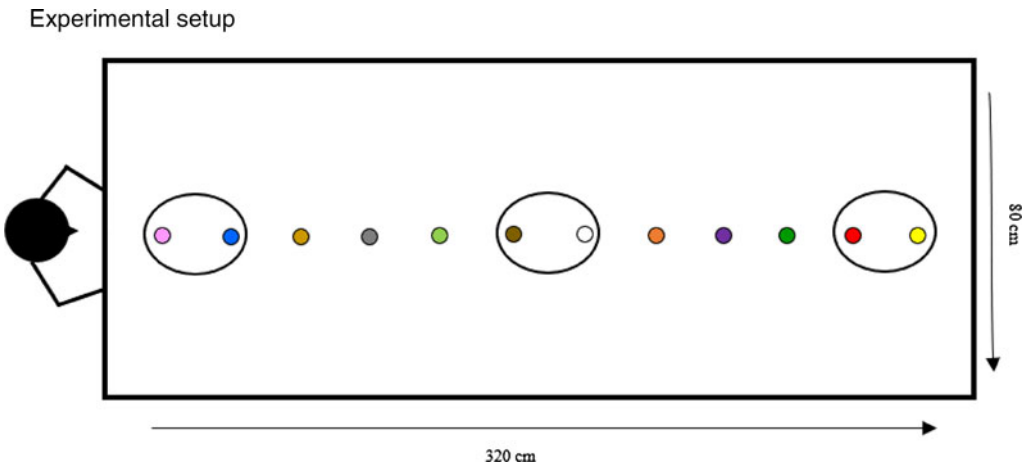


Figure 1. We used six locations in 3 regions on the table: within reach for the participant, middle of the table (out of reach for both participant and experimenter), and furthest from participant (but within reach of experimenter in the opposite condition) (Adapted from Todisco, 2022: 73).

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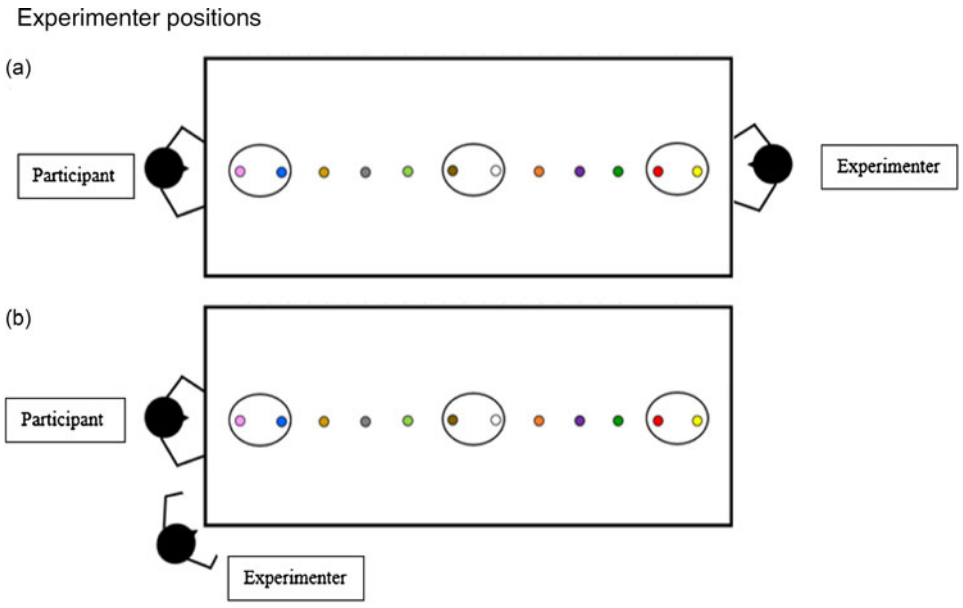


Figure 2. Figure 2a shows the participant and the experimenter sitting one in front of the other (opposite condition); while figure 2b shows the experimenter sitting next to the participant (side-by-side condition, Todisco, 2022: 73).

(i.e., "*Este corazón azul*", in European Spanish and "*Aquest cor blau*" in Catalan, with a post-nominal position of the adjective with respect to English). Participants could use only one of the three forms of demonstratives ([*este*(*this*)/ *ese*(*that*)/ *aquel*(*that*)] in European Spanish and [*aquest*(*this*)/ *aqueix* (*that*)/ *aquell* (*that*)] in Majorcan Catalan) per trial.

Each participant completed thirty-six trials, in which the experimenter sat side-by-side or opposite in the first/second half of the study (Figure 2). To keep up the memory cover, participants were asked at 6 times throughout the trials whether they correctly remembered the most recent position of one or more of the disks. Each language tested presented a design of 2 [position of the hearer: side-by-side and face-to-face] by 6 [distances], by 3 [repetitions per cell].

Bilinguals completed the trials twice, once for each language, with a one-week gap between sessions. The order of the languages tested was counterbalanced. Moreover, the whole session, from welcoming to debriefing, was conducted in the language of testing, to avoid any intrusion effect between languages. The order of the stimuli and location and the position of the experimenter were randomised. The same procedure was adopted for the adult monolingual control group of European Spanish, who completed the task once.

Data analyses

We analysed the data using two combined analyses. Analysis 1 compared demonstrative production in European Spanish and Majorcan Catalan bilingual speakers, as a function of language dominance. Analysis 2 compared European Spanish spoken by monolingual and simultaneous bilingual speakers.

Statistical analyses

We used multinomial multilevel modelling to partition the residual variance into a between-participant (the variance of the 'clustered' participant-level residuals) and a within-participant component (the variance of the responses-level residuals; Hoffman & Rovine, 2007; Sommet & Morselli, 2017). Adjusting for the presence of clustering effects (or the similarity among responses within a clustered group on particular types of the outcome measured) results in more accurate estimates of model parameters (Heck et al., 2012). Data and analysis script are available in the supplementary material (see https://osf.io/bp2nv/).

We decided *a priori* to include all predictors and interactions in the initial model, and use an iterative backward stepwise procedure to eliminate the most high-order, non-significant interaction from the subsequent model (providing all lower order interactions were retained for any significant higher-order interaction; Engqvist, 2005; Zhang, 2016). Note that this procedure only regards INTERACTION TERMS, not individual predictors (Smith, 2018). This backward stepwise procedure enables the identification and retention of any interactions that may influence the interpretation of main effects involved in the interaction, whilst also allowing for the elimination of non-significant interactions, to end up with the most parsimonious model. The final models thus include all main effects, all significant (higher order) interactions (if any) and all related lower order interactions (whether significant or not).

Models were double-checked before and after removal of non-significant interaction terms and minimal changes were seen in the classification table or to coefficients of main effects. We adopted the Akaike Information Criterion (Akaike, 1992) to assess the relative efficiency of each model. We used the classification table to assess the overall accuracy of the model. The baselines were chosen as Region 1 (at 25 and 50 cm from the participant), with the proximal demonstrative, while the experimenter sat side-by-side the participant. To test whether clustering would improve the model, we ran an empty model, only including potential random effects: clustering responses by participant, and by the testing order (whether bilinguals were first tested in Majorcan Catalan or European Spanish). Clustering by participant significantly improved the model ($p < .001$), whereas testing order had no effect ($p = .361$). Responses were therefore clustered only by participant.

5. Results

The frequencies and percentages of demonstrative use per position and region in the different language samples are presented in Table 1. All three demonstratives were used by monolingual and bilingual participants, for both European Spanish and Majorcan Catalan. The use of the second term *aqueix* (*that*) in

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Table 1. Frequencies and percentages of demonstrative use in region by hearer's position per language

	Demonstrative	Hearer's position	Region 1	Region 2	Region 3
Monolinguals tested in European Spanish	Proximal (*Este*)	Side-by-side	170 (94.44%)	4 (2.22%)	0 (0%)
		Face-to-face	169 (93.89%)	5 (2.78%)	0 (0%)
	Medial (*Ese*)	Side-by-side	10 (5.56%)	161 (89.44%)	41 (22.78%)
		Face-to-face	11 (6.11%)	161 (89.44%)	35 (19.44%)
	Distal (*Aquel*)	Side-by-side	0 (0%)	15 (8.33%)	139 (77.22%)
		Face-to-face	0 (0%)	14 (7.78%)	145 (80.56%)
Bilinguals tested in European Spanish	Proximal (*Este*)	Side-by-side	426 (98.61%)	55 (12.73%)	20 (4.63%)
		Face-to-face	425 (98.38%)	65 (15.05%)	20 (4.63%)
	Medial (*Ese*)	Side-by-side	5 (1.16%)	330 (76.39%)	126 (29.17%)
		Face-to-face	7 (1.62%)	327 (75.69%)	128 (29.63%)
	Distal (*Aquel*)	Side-by-side	1 (0.23%)	47 (10.88%)	286 (66.2%)
		Face-to-face	0 (0%)	40 (9.26%)	284 (65.74%)
Bilinguals tested in Majorcan Catalan	Proximal (*Aquest*)	Side-by-side	425 (98.38%)	115 (26.62%)	45 (10.42%)
		Face-to-face	425 (98.38%)	138 (31.94%)	52 (12.04%)
	Medial (*Aqueix*)	Side-by-side	5 (1.16%)	119 (27.55%)	11 (2.55%)
		Face-to-face	7 (1.62%)	109 (25.23%)	6 (1.39%)
	Distal (*Aquell*)	Side-by-side	2 (0.46%)	198 (45.83%)	376 (87.04%)
		Face-to-face	0 (0%)	185 (42.82%)	374 (86.57%)

Majorcan Catalan is used less than the second term *ese* (*that*) in European Spanish, by the same participants. Given the progressive reduction of the medial term *aqueix* (*that*) in Majorcan Catalan, either the first or the third demonstrative form will be recruited when referring to objects at a medium distance (i.e., Region 2). As can be seen in Table 1, there are cells of the design where a given demonstrative was barely used (e.g., the distal demonstrative is never used in Region 1).[7] To deal with these values, we used the Satterthwaite approximation to estimate effective degrees of freedom (Hall & Willink, 2001; Satterthwaite, 1946). However, a lack of variation, marking the strong relation between the proximal demonstrative and Region 1 (in >94% of all trials a proximal demonstrative was produced), may cause statistical separation in the models. In these cases, we followed up the *a priori* analysis with an *a posteriori* analysis in which we excluded variables with a lack of variance.

5. 1. Analysis 1. Demonstrative production as a function of language dominance in bilinguals: European Spanish and Majorcan Catalan.

In Analysis 1, we compared the production of demonstratives (proximal, medial, distal) in both languages as a function of distance from participant (3 Regions) by hearer position (2 positions) by language (European Spanish, Majorcan Catalan), language dominance (continuous), with responses clustered per participant. As a result of separation, we took Region 1 out for the *a posteriori* analysis.

Following the parsimonious approach to modelling, we eliminated the non-significant interactions from the model. The classification table for the analysis is reported in Appendix A (see Table A.1. and Table A.2). Tables A.1 and A.2 show the final model, which included the main *fixed effects*: region, hearer position, and the language in which the participant responded (*all categorical*) and language dominance (*continuous*), with only the region by language interaction. The use of demonstratives per language grouped as a function of language dominance (for visualisation purposes divided up into categories) are presented in Tables 2 and 3, below.

The region by language interaction was significant, $F(2, 3444) = 4.266$, $p = .014$, $\eta p^2 = .002$, suggesting that there is a (weak) between-language difference in how speakers use demonstratives to describe objects placed in different regions. The differences can be seen in Table 1: while demonstrative use in Region 1 is virtually identical, the bilinguals produce the medial term a lot less frequently in Majorcan Catalan than in European Spanish, both in Region 2 and 3.

Furthermore, there were main effects of language, $F(2, 3444) = 31.574$, $p < .001$, $\eta p^2 = 0.018$, and region, $F(2, 3444) = 41.514$, $p < .001$, $\eta p^2 = 0.024$ (see Tables 2 and 3 for detailed frequencies showing these differences). There was no effect of language dominance (BLP), $p = .617$, $\eta p^2 = .057$; or position of experimenter/hearer, $p = .237$, $\eta p^2 = .001$. There was a significant inter-subject variability for the medial terms (*ese/aqueix*, Estimate = 4.139, SE = .862, Z = 4.803, $p < .001$, 95% CI (2.752,

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Table 2. Demonstrative use in Majorcan Catalan divided by language dominance.

BLP score	Demonstrative	Region 1 (25–50 cm)	Region 2 (150–175 cm)	Region 3 (275–300 cm)
>+50	*Aquest*	240 (100%)	30 (12.5%)	3 (1.25%)
Spanish dominant	*Aqueix*	0 (0%)	94 (39.17%)	3 (1.25%)
N = 20	*Aquell*	0 (0%)	116 (48.33%)	234 (97.5%)
-50 <> 50	*Aquest*	383 (99.74%)	139 (36.2%)	75 (19.53%)
balanced bilinguals	*Aqueix*	0 (0%)	71 (18.49%)	14 (3.65%)
N = 32	*Aquell*	1 (0.26%)	174 (45.31%)	295 (76.82%)
<-50	*Aquest*	227 (94.58%)	84 (35%)	19 (7.92%)
Catalan dominant	*Aqueix*	12 (5%)	63 (26.25%)	0 (0%)
N = 20	*Aquell*	1 (0.42%)	93 (38.75%)	221 (92.08%)

Note. Table 2 reports demonstrative use in Majorcan Catalan divided by language dominance. Although analysed as a continuous variable, BLP results have been divided in 3 groups for a better visualization. The first group (N = 20) is constituted by bilinguals whose dominant language is European Spanish; the second group (N = 32) is constituted by balanced bilinguals; the third group (N = 20) is constituted by bilinguals whose dominant language is Majorcan Catalan.

6.225), as well as the distal terms (*aquel/aquell*, Estimate = 8.028, SE = 1.574, Z = 5.101, $p < .001$, 95% CI (5.467, 11.788), suggesting that the variation of demonstrative use also occurs on an individual level.

Contradicting our hypothesis, language dominance did not emerge as a significant effect. In other words, being dominant in a language characterized by a tendency for a two-term demonstrative system, in this case Majorcan Catalan, did not result in a significant reduction in the use of the three-term European Spanish demonstrative system. By the same token, being dominant in a language characterized by a stable three-term demonstrative system, such as European Spanish, does not result in the maintenance of the three terms in Majorcan Catalan. For visualisation purposes, we divided the sample into three BLP "categories", representing demonstrative production in European Spanish (Table 2) and Majorcan Catalan (Table 3).

5. 2. Analysis 2. European Spanish spoken by monolingual and bilingual speakers.

In Analysis 2, we compared European Spanish, as spoken by monolingual vs. simultaneous European Spanish–Majorcan Catalan bilingual speakers. As Table 1 shows, there is a very strong bias for monolingual speakers to only use proximal demonstratives in Region 1 (specifically, the proximal demonstrative is almost always used in Region 1, but in fewer than 3% of Region 2 trials, and never in Region 3, while the distal demonstrative in turn is never used in Region 1). This led to separation effects in the *a priori* models. Therefore, we took Region 1 and the proximal demonstrative (*este*, *this*) out of the model[8] – note that all further effects are therefore between Region 2 and 3, and *ese* (*that*) and *aquel* (*that*).

The final model included only main predictors (all interactions were non-significant). The final results showed a main effect of region, Region, $F(1, 2275) = 76.304$, $p < .001$, $\eta p^2 = .032$, but no effect of position of experimenter/hearer, $F(1, 2275) = .03$, $p = .862$, $\eta p^2 < .001$, nor language, $F(1, 61) = .645$, $p = .425$, $\eta p^2 = .01$. Speakers were more likely to use the distal demonstrative *aquel* (*that*) than the medial demonstrative *ese* (*that*) when the object was placed in Region 3, compared to Region 2 (cf. Table 1). Again, there was significant inter-subject variability (Estimate = 8.967, SE = 1.558, Z = 5.754, $p < .001$, 95% CI (6.378, 12.606), meaning that there is significant variation in demonstrative use on an individual level. Model results are reported in Appendix A, Tables A.3 and A.4.

Table 3. Demonstrative use in European Spanish divided by language dominance.

BLP score	Demonstrative	Region 1 (25–50 cm)	Region 2 (150–175 cm)	Region 3 (275–300 cm)
>+50	*Este*	238 (99.17%)	12 (5%)	1 (0.42%)
Spanish dominant	*Ese*	2 (0.83%)	184 (76.67%)	59 (24.58%)
N = 20	*Aquel*	0 (0%)	44 (18.33%)	180 (75%)
-50 <> 50	*Este*	375 (97.66%)	66 (17.19%)	28 (7.29%)
balanced bilinguals	*Ese*	9 (2.34%)	308 (80.21%)	125 (32.55%)
N = 32	*Aquel*	0 (0%)	10 (2.6%)	231 (60.16%)
<-50	*Este*	238 (99.17%)	42 (17.5%)	11 (4.58%)
Catalan dominant	*Ese*	1 (0.42%)	165 (68.75%)	70 (29.17%)
N = 20	*Aquel*	1 (0.42%)	33 (13.75%)	159 6.25%)

Note. Table 3 reports demonstrative use in European Spanish divided by language dominance. Although analysed as a continuous variable, BLP results have been divided in 3 groups for a better visualization. The first group (N = 20) is constituted by bilinguals whose dominant language is European Spanish; the second group (N = 32) is constituted by balanced bilinguals; the third group (N = 20) is constituted by bilinguals whose dominant language is Majorcan Catalan.

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As reported, the *a priori* model in Analysis 2 showed separation because the proximal term in the monolingual sample was so tightly related to Region 1, resulting in a lack of variance in specifically Region 3. However, if the medial term is disappearing in Majorcan Catalan, the effect – if any – would be expected in this medial region: if the medial term is not used as frequently, either the proximal or distal term has to be recruited instead. The necessary step of fully eliminating the proximal demonstrative from the *a posteriori* model therefore also eliminated a key contrast to find the interaction between Region and Language, which was apparent in Analysis 1.

The data in Table 1 seem supportive of the medial term reduction in Majorcan Catalan (*aqueix, that*). When comparing the three language groups, European Spanish monolinguals use the medial term around 90% of trials in Region 2, this frequency is reduced to around 75% in bilinguals tested in European Spanish, and merely 25% in bilinguals tested in Majorcan Catalan. This decrease of the medial term is complemented by increased use of proximal and distal terms: proximal: <3% for monolinguals, around 14% in the bilinguals tested in European Spanish and up to 32% in bilinguals tested in Majorcan Catalan; distal: around 8% in the monolingual sample, around 10% in the bilinguals tested in European Spanish, and up to 45% in bilinguals tested in Majorcan Catalan. In Analysis 1, we found a main effect between the two bilingual language samples, an effect that was lost in the *a posteriori* model in Analysis 2. Therefore, we decided to run an exploratory, *post hoc* follow-up, testing the difference between demonstrative use in our monolingual sample versus the bilingual sample when speaking European Spanish, only for Region 2.

Using the iterative backwards stepwise procedure, we arrived at a final model including the position of the hearer and language group as fixed effects, with participant as random effect. This exploratory analysis suggested the difference between monolingual and bilingual speakers when speaking European Spanish is significant in Region 2, $F(2, 169) = 5.905$, $p = .003$, $\eta p^2 = .065$. However, while these results fit well with the literature and hypotheses, this is an exploratory follow-up analysis and needs to be interpreted with caution.

Overall, the results show a clear difference in how distance from a speaker affects the production of demonstratives in respectively European Spanish and Majorcan Catalan, while neither the position of the hearer manipulation nor language dominance influenced demonstrative production. The frequencies in Table 1 show that monolingual Spanish speakers employ their demonstratives most rigidly, such that each demonstrative is recruited mainly for a dedicated location (proximal, medial, or distal). The Majorcan Catalan demonstrative system, on the other hand, seems far more flexible: losing the medial term, the distances at which the use of proximal or distal demonstratives are appropriate become more malleable. While the difference between the monolingual European Spanish sample and the bilingual Majorcan Catalan sample emerged in the planned analyses, statistical separation in the model comparing monolingual versus bilingual European Spanish prevented the identification of a significant distinction between the two samples. An exploratory follow-up targeting Region 2 showed differences between mono- and bilingual speakers of European Spanish, where the bilingual speakers deploy their demonstratives more flexible. While language dominance did not have a measurable effect, the three language samples seem to form a continuum from rigid to more flexible demonstrative use.

6. General discussion

The present experiments were designed to examine the impact of simultaneous bilingualism and language dominance on demonstrative usage. After assessing the difference between Majorcan Catalan and European Spanish, we studied whether the degree of dominance in one language or the other plays a role in the number of terms and/or parameters used; and we focused on the effect of the position of the hearer during the interaction, to contribute to the ongoing debate on the parameters affecting the usage of demonstratives, by using the memory game paradigm (Coventry et al., 2008; Gudde et al., 2018). This paradigm allowed us to manipulate the position of the interlocutors and referent distance under strictly controlled conditions.

As regards the relation between deixis and simultaneous bilingualism, we expected simultaneous bilinguals to show a tendency towards the demonstrative system of the most dominant language in number of terms and/or parameters, when performing in the less dominant language. However, this was not the case in our data. When testing the effect of language dominance on demonstrative production, simultaneous bilinguals of European Spanish and Majorcan Catalan behaved differently according to the language tested, but not as a function of their language dominance in one language or the other.

However, there was some evidence for a difference between the monolingual and bilingual speakers in European Spanish. Monolingual speakers use the proximal demonstrative *este* (*this*) almost exclusively in their peri-personal space, and in less than 3% of the cases to refer to middle distance position. In contrast, bilingual speakers show a higher use of the proximal and distal demonstrative forms in medial position, with the proximal demonstrative *este* (*this*) used around 12-15% and *aquel* (*that*) used around 10% of the cases. No interaction was found between this difference in use and language dominance. In other words, being dominant in Majorcan Catalan – a language characterized by a tendency for a two-term demonstrative system – did not determine a reduction in the use of three-term European Spanish demonstrative system. By the same token, being dominant in European Spanish – a language characterized by a stable three-term demonstrative system – did not determine a maintenance of the three terms in Majorcan Catalan, either. Moreover, no overall language intrusion effects were found for the parameters influencing the usage of demonstratives either.

Our findings are in line with some previous studies on simultaneous bilingualism suggesting that the coactivation of the two languages does not lead to any intrusion effect (Costa & Santesteban, 2004; Macizo et al., 2010; Meuter & Allport, 1999; Misra et al., 2012). Costa and Santesteban (2004) highlighted that high dominance does play a role in maintaining this coactivation separated – that is, in preventing intrusion of the more dominant language on the less dominant one. Thus, although our participants showed different levels of dominance in European Spanish and Majorcan Catalan, those levels did not affect the less dominant language. A possible explanation for these findings is that the coactivation in the brain prevails on language dominance when participants are immersed in their original bilingual speaking context. For instance, previous studies reported language intrusion as an effect of the pressure of the more dominant language, in a context of sequential bilinguals living out of their L1 speaking context (Dussias & Sagarra, 2007; Vulchanova et al., 2020, 2022a). In our study, participants reported and showed differing levels of language dominance,

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but no absolute dominance level neither in European Spanish nor in Majorcan Catalan. Moreover, they were all simultaneous bilinguals immersed in their original bilingual speaking context. The constant exposure, although passive, to the less dominant languages, might result in the coactivation and in the maintenance of linguistic components learned in the early phases of language acquisition, such as demonstratives (Todisco et al., 2020).

Our results confirmed that physical distance strongly contributed to demonstrative usage. Proximal demonstrative forms (*este*, *aquest*; *this*) were used for the peri-personal space of the participant – Region 1 – while medial demonstrative forms (*ese, aqueix*; *that*) and distal demonstrative forms (*aquel, aquell*; *that*) were used for the extra-personal space of the participant – Regions 2 and 3. In contrast, however, we failed to find an effect of the position of the hearer in monolingual European Spanish speakers, let alone evidence of intrusion effects in bilingual speakers for this variable.

Both Coventry et al. (2008) and Rubio-Fernandez (2022) found effects of position of the hearer, in which European Spanish monolinguals used the middle demonstrative form *ese* (*that*) for the referent closer to the hearer than to the speaker. In European Spanish–Catalan bilinguals, Rubio-Fernandez (2022) found no effect of the position of the hearer in either language. This absence of the hearer's position effect in bilingual speakers is suggested to be caused by an intrusion effect of Catalan reducing the sensitivity to the interlocutor's position (Rubio-Fernandez, 2022).

Discrepancies in the presence or absence of hearer position effects in European Spanish could be a result of participant variability and/or methodological differences between studies. Coventry et al. (2023) tested effects of the position of the hearer and distance across 29 languages (including European Spanish), failing to find an effect of the hearer's position in Spanish (although they did find person-centred effects in eight of the languages tested). For every language tested they report significant participant variability in demonstrative use, suggesting that one of the reasons for such variability is likely to be the choice of reference frame selected by participants. Rather than it being obligatory to use a demonstrative to refer to an object as near a hearer, for example, Coventry et al. argue that demonstratives may function like spatial adpositions, with established individual differences in the choice of spatial reference frame participants choose to employ (Tosi et al., 2020; Tversky & Hard, 2009). Moreover, the choice of reference frame with adpositions is affected by the degree of interaction between speaker and hearer (Schober, 1993), and this may also be a likely reason why effects of the hearer's position come and go in studies on demonstratives. For instance, the experimental setting in Coventry et al. (2008) presented a series of playing cards stating who (e.g., either the participant or the experimenter) was to place the object on the table, which made the interaction more pronounced. The experimental setting in Rubio-Fernandez (2022) was also based on (imaginary) collaborative interplay between two interlocutors, with the participant asked to imagine he/she was one of two line-drawn characters in an online picture task asking a friend (the other line-drawn character) to pass him/her objects during packing (with participants completing a speech bubble). This study was not a language production task but did include more positions of speaker and hearer than used in studies to date using the memory game paradigm. Considering all of the above, the high degree of interaction might determine a change of perspective of the speaker towards the hearer who is actually acting on the object. In the present study, interaction between participants was less, perhaps therefore reducing the likelihood of participants taking the hearer's perspective. Future studies would do well to manipulate the level of interaction between participants within the same paradigms to test whether the effects of the position of the hearer can indeed be manipulated as a function of degree of interaction.

Overall, and given the different parameters affecting the same language across experiments, we claim that a strict one-to-one correspondence between parameters and languages is not appropriate to provide a reliable characterization of how demonstratives are used during interaction. In this respect, descriptive grammar has often classified languages as distance-oriented or person-oriented according to the main feature characterising the use of demonstrative forms within and without interaction. European Spanish has often been defined as person-oriented due to the general use of the middle term *ese* (*that*), which refers both to middle distance from the speaker and closeness to the hearer (e.g., Coventry et al., 2008; Rubio-Fernandez, 2022). Catalan, instead, has been defined as person oriented as a consequence of the hearer's position effect in motion verbs (Casanova, 1993). Our results do not match this classification. In accordance with Peeters et al. (2021), we consider that each language might be affected by a wider set (or range) of parameters (i.e., taking into account the position of the hearer, focusing on cognitive and psychological distance, and the like), from which speakers select the most salient one in accordance with the information they want to convey during language production.

Moreover, although no language dominance effects were found, we still consider language dominance as a pivotal candidate to consider when studying the factors affecting demonstrative usage. In the case of sequential bilinguals immersed in the L2 linguistic environment, language dominance has shown to have a stronger attrition effect towards L2 structures (Dussias & Sagarra, 2007; Vulchanova et al., 2022a). However, in the case of simultaneous bilinguals immersed in a bilingual linguistic environment, this condition preserves differing structures in different L1s no matter the level of dominance in one language or another. In addition, the difference between simultaneous and sequential type of bilingualism also plays a crucial role in maintaining active the two languages when necessary.

In view of our results, the present study contributes to a better understanding of how simultaneous bilingual speakers employ different deictic expressions and how bilingualism can affect production during language interaction.

7. Conclusions

In the present paper, we aimed to assess the relation between spatial deixis and bilingualism. More specifically, we wanted to assess whether different levels of language dominance affect the use of demonstratives in more or in less dominant languages. Although considering language dominance a pivotal parameter to study demonstratives, our results did not show any effect in the usage of demonstratives by European Spanish–Majorcan Catalan simultaneous bilinguals. Moreover, while our results showed a significant effect of physical distance in the use of demonstratives and a main effect of the language, no effects of the position of the hearer were found in either European Spanish or Majorcan Catalan.

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Supplementary Material. For supplementary material accompanying this paper, visit https://doi.org/10.1017/S1366728924000051

Data availability. The data that support the findings of this study are openly available at https://osf.io/bp2nv/.

Competing interest declaration. The Authors declare no competing interests.

Notes

[1] Although demonstratives have different forms for gender and number, the unmarked masculine singular pronominal form will be used, unless differently specified. This said, the demonstrative forms for the languages in use in the present study will be *this/that* for English, *este/ese/aquel* for Spanish, and *aquest/aqueix/aquell* for Catalan.

[2] The remaining 8% shows either one demonstrative term or more than four forms (Diessel and Coventry, 2020).

[3] In accordance with reference grammars, the terms proximal/medial/distal will be adopted to describe the demonstrative system of a given language (Diessel, 1999, 2005). The use of the term "proximal" will refer to the "first term demonstrative", "medial" to the "second term demonstrative", and "distal" to the "third term demonstrative". The terminology will be used interchangeably without strictly conveying a spatial distance connotation.

[4] It is important to highlight that the Valencian system of demonstratives does not belong to the Peninsular Catalan variety, and it is characterized by a stable three-terms demonstrative system: *aquest/eixe/aquell* (this/that/that).

[5] Catalan is spoken in several areas, such as Catalonia, Valencia, Andorra, the Balearic Islands, the Carche, Roussillon (France) and Alghero (Sardinia) (Nogué-Serrano, 2015).

[6] The two-term system characterizes the vast majority of the eastern Catalan speaking areas (e.g., Central and Northern Catalan), whereas the south-western (e.g., la Franja, Valencian and Balearic Catalan) employ a three-term system (i.e., Valencia: 'este'(this) / 'eixe' (that) /'aquell'(that); Mallorca, Ibiza: 'aquest'(this) / 'aqueix'(that) / 'aquell'(that), where 'eixe' and 'aqueix'; Brucart (2002)).

[7] This is potentially problematic for the model, as there is consequently no variation between conditions (i.e., one or more covariates are such a perfect predictor that analysis is hardly possible and may lead to a feature known as separation; Cook et al., 2018). This may result in implausible parameter estimates, such as the Relative Risk Ration being in the hundreds of thousands, and effect sizes may be greatly exaggerated (Starkweather & Moske, 2011).

[8] For transparency reasons we represent the *a priori* models, including separation, in Appendix C.

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