Is the Mano a Tulipano gesture compatible with canonical questions? An empirical study of a speech act marking gesture

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Abstract. In this paper, we present two experimental studies on the co-speech *Mano a Tulipano* (MAT), a gesture that is extensively used by native speakers of Italian and that typically accompanies interrogative speech acts. While there is broad consensus, in both the descriptive and the more formal literature, that MAT has a question meaning, there is no consensus on what kind of question is conveyed or marked by this gesture. Some researchers argue that co-speech MAT is ambiguous and can occur with both canonical and non-canonical questions. Other researchers have argued that MAT is presuppositional in nature and is only compatible with non-canonical questions. To test the hypothesis that MAT is fully compatible with non-canonical questions only, we conducted two acceptability judgment studies in which the participants' task was to evaluate the appropriateness of the MAT gesture associated to two types of questions: a canonical question (i.e., a context in which, according to the presuppositional account of MAT, the presupposition is not satisfied), and a non-canonical (biased) question. We ran a binary forced-choice sentence evaluation task (Study 1) and a gradient acceptability judgment study (Study 2) to test if and at which rate Italian participants accepted the MAT gesture accompanying canonical questions. Our results show that MAT is fully acceptable only when the presupposition that the question is non-canonical is satisfied, compatibly with the presuppositional account. When this presupposition is not supported by the context, judgments on MAT were more variable across participants when a binary judgment was requested (Study 1); moreover, MAT received intermediate ratings by all the participants when a gradient judgment was required (Study 2).

Keywords: gestures, non-canonical questions, negative bias

1. Introduction

In recent years, the study of gestures has become increasingly prominent in linguistics, and in particular in formal semantics and pragmatics (Lascarides and Stone, 2009; Giorgolo, 2011; Esipova, 2021; Schlenker, 2011; a.o.). Co-speech gestures, i.e., gestures that co-occur with a linguistic utterance, have been argued not to contribute to the assertoric content of the utterance, but scholars disagree with respect to the nature of this non-assertoric content. For example, Ebert (2014) argues that they are interpreted as supplements, while Schlenker (2015, 2020) maintains that they are presuppositional in nature. With respect to pro-speech gestures, i.e., gestures that do not co-occur with a simultaneous linguistic utterance, Schlenker (2019) argues that they can be used to convey different types of meaning, and, more broadly, that the typology of linguistic inferences that we are familiar with from the study of spoken language (presuppositions, anti-presuppositions, standard scalar implicatures, blind scalar implicatures) can be replicated with pro-speech gestures.

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The present paper builds and expands on this literature by focusing on a symbolic gesture extensively used by native speakers of Italian, which we call 'Mano a Tulipano' (MAT), 'tulip hand' (cf. Poggi, 2007, 2010; Ippolito, 2019, 2021). Previous literature has taken the contribution provided by MAT to be pragmatic as it appears to express the illocutionary intent of the spoken utterance associated with it. After a summary of previous observations by De Jorio (1979 [1832]) and Diadori (1990), Kendon (1995) concludes that the MAT gesture indicates that the gesturer is asking a question (see also Kendon, 2004; Poggi, 2010; a.o).

The goal of this paper is to further explore the contribution of MAT on the interpretive process, and assess the merits of different views on the kind of interrogative meaning it conveys. More specifically, it is our aim to verify whether MAT is an interrogative marker compatible with both canonical and non-canonical questions, or whether its occurrence is restricted to non-canonical questions, as recently argued by Ippolito (2021)[1]. The paper is structured as follows. In Section 1.1 we lay down our assumptions about the semantics and pragmatics of questions in order to introduce the notions that are going to be relevant to appreciate the difference between the theoretical approaches to MAT. In Section 1.2, we describe the form of MAT and discuss the proposals for its interpretation. In Sections 2 and 3 we present our Study 1 and Study 2, respectively, to test the predictions of the theories previously introduced. In Section 4 we discuss our experimental results and conclude, outlining future lines of research.

1.1. Canonical and non-canonical questions

A question is normally accompanied by the assumptions that, when uttering the question, the speaker (i) does not already know the answer to it, (ii) believes that the addressee knows the answer, and (iii) believes that the addressee is willing to provide it (Searle, 1969). These assumptions are summed up in the felicity conditions in (1), taken from Farkas (2021) – see also Dayal (2016) for similar ideas.

(1) Default assumptions accompanying question acts:
   a. Speaker ignorance: The speaker's epistemic state is neutral relative to the possible resolutions of the issue the speaker raises.
   b. Addressee competence: The speaker assumes that the addressee knows the information that settles the issue the speaker raises.
   c. Addressee compliance: The speaker assumes that the addressee will provide this information in the immediate future as a result of the speaker's speech act.

Questions that are accompanied by these assumptions are called 'canonical questions'. Questions that do not comply with one or more of these assumptions are 'non-canonical'. In this paper, we focus on one kind of non-canonical questions, namely biased questions. Biased questions are exemplified by polar questions such as (2): in uttering this question, the speaker is understood to be biased towards the positive answer to the question (the speaker believes that Anna is vegetarian), and thus the speaker ignorance assumption does not hold:

(2) *Leo believes that Anna is a vegetarian, but she has just ordered a steak.*
   Leo: Aren't you vegetarian?

[1] MAT can also occur with declarative sentences. These cases are discussed in Ippolito (2019, 2021).

Ippolito (2022) argues that constituent questions can also be biased. She identifies two kinds of biased constituent questions: constituent questions biased against one particular and salient alternative in the denotation of the question, and constituent questions biased against all the alternatives in the denotation of the question. Ippolito also shows that each of these two types of non-canonical constituent questions is marked by a prosodic contour that differs from the prosodic contour of the other type of non-canonical constituent question and from the prosodic contour of canonical questions.[2] Here we are interested in constituent questions biased against all the alternatives in their denotation. The examples in (3) and (4) illustrate how the interrogative sentence *Come lo paghiamo l'affitto?* ('How are we going to pay the rent?') will have a different prosodic contour and a different interpretation in the scenarios described in (3) and in (4). In the scenario in (3), Maria is genuinely interested in finding out how they are going to pay the rent, whereas in (4) she is skeptical that there is a way in which they will be able to pay rent, or, to put it in Ippolito's terms, the question in (4) indicates that the speaker believes that none of the possible answers to the question is compatible with her expectations:

(3) *Gianni and Maria just rented an apartment. The landlord let them choose whether to pay with a check or with a bank transfer. Maria says:*
Come lo paghiamo l'affitto?
how it pay-pres.1st.pl the-rent?
'How are we going to pay the rent?'

(4) *Gianni and Maria just rented an apartment and they are late in paying the rent. Today Gianni intended to make a last-minute bank transfer to avoid penalties but the bank's computer system is down. Maria says:*
Come lo paghiamo l'affitto?
How it pay-pres.1st.pl the-rent?
'How are we going to pay the rent?'

1.2. The forms of MAT

MAT can accompany speakers' verbal utterances (and thus be used as a co-speech gesture), or it can be used on its own (as a pro-speech gesture). Its meaning is well-understood by native speakers of Italian, and it may thus be considered an 'emblem' (Ekman and Friesen, 1969), or 'quotable gesture' (Kendon, 1992): if it occurs as a pro-speech gesture, it is typically taken to mean 'What are you saying?' or 'What are you doing?'. Focusing on its kinematic, MAT can be divided in two parts. The first part consists of a path movement in which the speaker positions their hand at the level of their torso: during this movement, the hand achieves the "tulip" configuration in which all fingertips touch (Ippolito, 2019; 2021). The static gesture is illustrated in Figure 1.

[2] Ippolito (2022) provides arguments that the kind of constituent question biased against all the alternatives in the denotation of the question is different in crucial respects from negative rhetorical questions such as *Who has ever liked Abe's blueberry pie?* or *Who has ever said a word against the Board of Directors?*, and that therefore is best analyzed not as a rhetorical question but as a biased question.

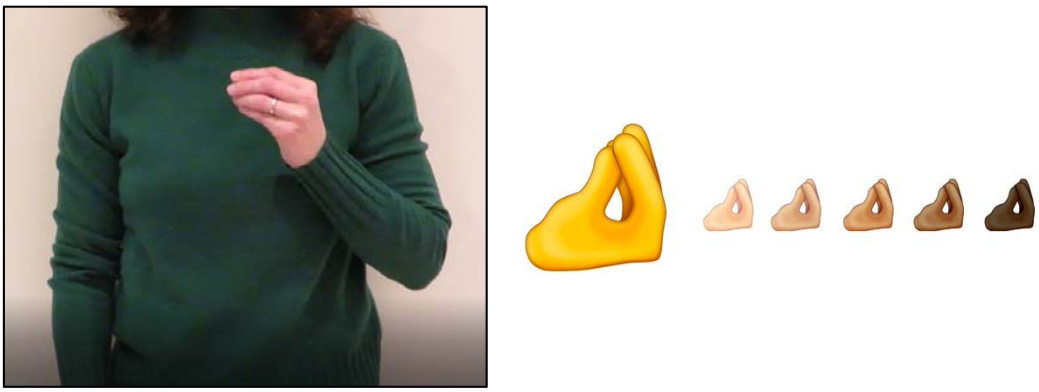

Figure 1. MAT gesture shown by a native speaker of Italian (left) and added as an emoji (right) in 2020 (https://emojipedia.org/pinched-fingers/).

The second part consists of a local movement which is generated at the wrist and in which the tulip hand moves repeatedly up and inward towards the speaker. Following Ippolito (2019, 2021), we refer to this local movement as the 'trill'. It has been noticed that this repeated movement can be fast and small in amplitude, or it can be slow and wider. These different tempos of the gesture reflect different readings associated to MAT: according to Poggi (1983), the fast MAT would indicate a canonical question, whereas its slow version would mark ironic questions; according to Ippolito (2019, 2021), on the other hand, MAT always marks non-canonical questions (biased ones when the movement is fast, rhetorical ones when it is slow). These observations raise the question of how MAT is interpreted.

1.3. The interpretation of MAT

As already alluded to, some scholars who adopt a mainly descriptive approach to the study of gestures, claim that MAT has an interrogative function. All scholars agree that MAT can accompany non-canonical questions: Giorgi and Dal Farra (2019) report that MAT can accompany what they call 'surprise-disapproval questions'; Poggi (1983) argues that MAT can mark a 'pseudo-question', that is, "an act that has the form of a question, but that, in terms of how it is used, does not meet the conditions that are required for a genuine or sincere question" (Kendon, 1992: 100, based on Poggi, 1983). This characterization corresponds to the description of a non-canonical question that fails to meet at least one of the felicity conditions in (1). For instance, Poggi, D'Errico and Vincze,. (2013) analyzes a TV debate in which a left-wing deputy (and former judge), whose technical objections to a new law proposed by the then (right-wing) minister of justice (and former engineer) were not fully understood, bursts out: *Ma come l'ha fatto il ministro, scusi?* ('I beg your pardon, how were you ever a minister?'), accompanying this utterance with MAT. Poggi and colleagues comment that the question is meant to be rhetorical, implying that the interlocutor does not have the competence to be a minister.

It is on the other hand controversial whether MAT is compatible with genuine, canonical, questions. Some scholars claim that this is the case: McNeill (1998) for instance claims that MAT performs a specific speech act function: "to get the interlocutor to address your question in a satisfactory manner" (McNeill, 1998: 14; see also Diadori, 1990). Kendon (1995) argues

that the primary purpose of MAT is "making a request for some information, when seeking clarification, an explanation or a justification for something the other has said or done", even if in some cases it may be "used as a way in which a participant may comment negatively on remarks of others" (Kendon, 1995: 258). Poggi (1983) argues that MAT is in fact ambiguous between having a 'true question' meaning and thus being able to accompany canonical questions and the aforementioned pseudo-question meaning: disambiguation would occur thanks to the tempo and amplitude of the movement (fast and restricted for canonical questions; slow and wide for non-canonical ones), and/or facial cues (presence or absence of frowning eyebrows, position of the head, etc.).

In contrast, Ippolito (2019, 2021) assumes a Hamblin-style semantics for polar and constituent questions (according to which, for example, the denotation of the constituent question *How are we going to pay the rent?* is a set {we are going to pay the rent by *a*, we are going to pay the rent by *b*, we are going to pay the rent by *c*}, where {*a, b, c*} is the contextually restricted denotation of the *wh*-operator *how*), and argues that co-speech MAT always accompanies non-canonical questions: MAT is a question modifier, triggering the presupposition that the answers in the denotation of the question are all inconsistent with the speaker's expectations. When produced with a fast tempo (the default tempo), this bias is restricted to the speaker; when produced with a slower tempo, the bias is required to be part of the common ground. The point that is relevant for the present study is that, in this proposal, regardless of the tempo of the gesture, the semantic contribution of MAT is incompatible with canonical questions.

The goal of our research is to gain empirical evidence in favor of or against the idea that MAT can accompany canonical questions. More specifically, we aimed at testing Ippolito (2021)'s predictions. Since it is framed within model-theoretic semantics, her account allows us to formulate clearer hypotheses that will be tested experimentally.

2. Study 1

The first study was a dichotomous acceptability judgment study in which participants were asked to judge the appropriateness of gestures (including MAT) in different contexts.

2.1. Method

The material comprised a total of 60 scenarios constituted by a written paragraph involving a situation (for example, paying the rent) and two people (for example, Gianni and Maria); at the end of the paragraph, a written question (uttered by one of the two people involved in the context to the other person) was displayed, accompanied by a mute video clip showing a gesture. Participants were instructed to read the given context and the final question carefully, to play the video clip of the gesture (that was positioned immediately under the final question, which was highlighted in bold), and to evaluate the appropriateness of the gesture in the given scenario with a forced-choice answer: appropriate or not appropriate.

Of the 60 scenarios created, 24 were critical items involving the fast contour MAT gesture displayed in two experimental conditions, rotated across two lists. In one condition, labelled 'neutral', the MAT gesture accompanied a canonical information-seeking question, as in the

example in (3) discussed above. In the other condition, labelled as 'biased', the same gesture accompanied the same question but with the speaker communicating that she actually believes that no answer to her questions meet her expectations, as in (4). The test also comprised 36 filler items, which had the same structure as the critical ones (a context that ends with a question accompanied by a gesture) but involved three other gestures, which were either appropriate (matching) or inappropriate (mismatching) in the given scenario. For example, in a scenario in which two people are talking about their neighbor's new car, the question 'How much did he pay for it?' uttered by one of the characters in the story was accompanied by the gesture for 'money': given that the content of the gesture (money) matched the content of the conversation, we expected the gesture to be evaluated as appropriate in this case. The same gesture was shown in another filler item accompanying a question like 'What are you cooking?' uttered by one of the interlocutors to someone busy in the kitchen, and thus we expected a rejection (i.e., selection of the 'not appropriate' response). Considering the appropriateness of the gesture in the given context, we labelled these conditions as 'matching' and 'mismatching', respectively.

Items were rotated across two lists, each comprising a total of 48 items: 12 target items with the MAT gesture (6 with canonical, and 6 with non-canonical questions), and 36 filler items with the other three gestures (18 matching and 18 mismatching combinations). The test was implemented on Qualtrics, a platform for online testing. A total of 58 (36 female) Italian students with a mean age of 24 years (age range 19-48) took part in the study.

2.2. Results

In Study 1, the acceptance rate of MAT biased contexts was 91% (*SD* =.16), analogous to that of matching controls (91%, *SD* = .11). In neutral contexts, the acceptance rate was significantly lower (58%, *SD* = .37), albeit higher than mismatching controls, which were almost always rejected, as shown in Figure 2 (acceptance rate: 2%, *SD* = .06).

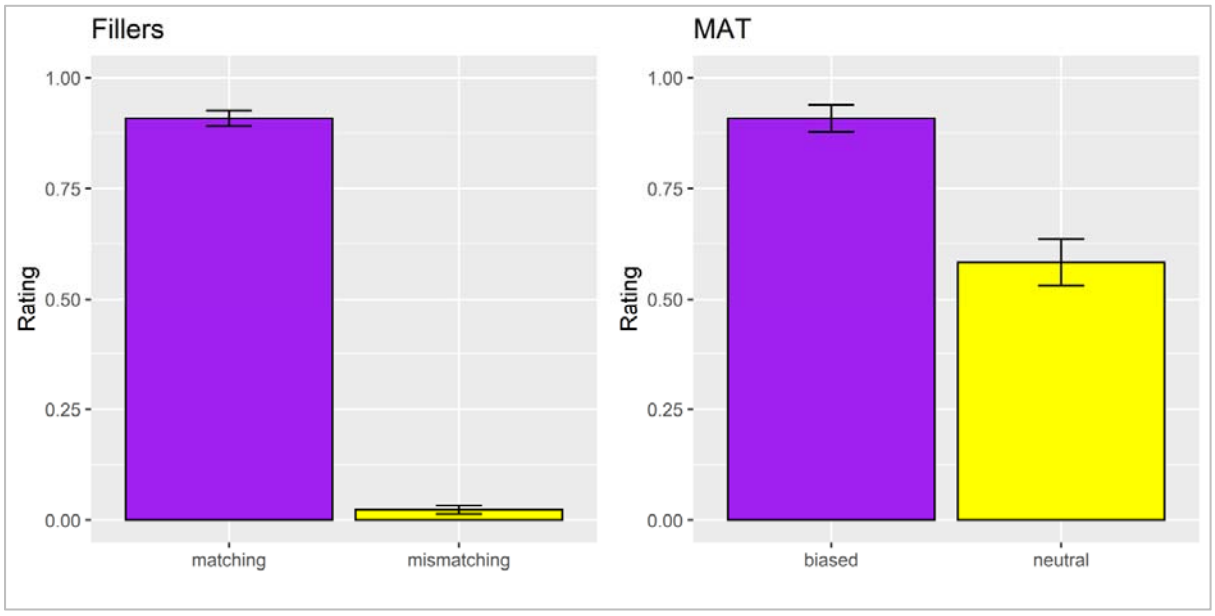

Figure 2. Mean acceptance rate in the binary judgment task (Study 1).

Looking at participants' rating distribution in the MAT-neutral condition, a clear bimodal distribution is found: the participants clearly split between accepting and rejecting the gesture in this condition, and are in general consistent in their answers. Of the 58 participants, 31 participants (53%) almost always accepted MAT in this condition (they accepted it at least 4 out of 6 items) and 22 (38%) almost always rejected it. Only 5 participants (9%) were equivocal and accepted/rejected MAT in this condition half of the times. We return to this finding in the discussion section.

To test the different predictions outlined above and see whether the type of question (neutral vs. biased) that was accompanied by MAT affected the participants' ratings of the appropriateness of the gesture, we focused on the contrast between the ratings of the MAT gesture in the two conditions. As is evident from the graph, MAT was less acceptable in conjunction with neutral information seeking questions, than with biased questions.

To evaluate this contrast statistically, we implemented a logistic mixed effects model using the glmer() function in the lmerTest package (Kuznetsova et al., 2017). The model included condition (neutral vs. biased context) as a fixed effect, and subjects and items as random intercepts (including random condition slopes for subjects and items resulted in a failure of convergence). The analyses revealed that the mean ratings of MAT accompanying a neutral question were significantly lower than the ratings of MAT accompanying a biased question (*estimate* = -2.6252, *SE* = 0.2723, $z = 9.641$, $p < .0001$).

2.3. Discussion

The experimental design involved the presentation of MAT as accompanying questions that, depending on the preceding contexts, were expected to be interpreted as either canonical or biased. Participants almost always rated MAT as appropriate in biased contexts, whereas the rate of acceptance of MAT in neutral contexts was significantly lower. This result is consistent with Ippolito (2019)'s theory that MAT presupposes the non-canonicity of the question it accompanies. Nevertheless, participants judged MAT to be appropriate in neutral contexts at higher rates than mismatching fillers, which were always rejected. Moreover, participants split in their judgments, either always accepting, or always rejecting, the gesture in neutral context.

This bimodal distribution of values could in principle be compatible with the ambiguity account sketched by Poggi (1983), as one might conjecture that some participants access the canonical question reading of MAT and thus they accept it, while others activate the non-canonical question reading, thus sanctioning it. We will return to this point in the discussion of our second study below. However, we argue that these findings are fully compatible with the bias-only theory, which interprets the infelicity of MAT in neutral contexts in terms of a presupposition failure. According to this hypothesis, MAT is viewed as triggering the presupposition that one of the felicity conditions of a canonical question is not met; since neutral contexts do not support this presupposition, MAT turns out to be infelicitous. Now, it is possible that some participants in at least some contexts might have accommodated the presupposition activated by MAT, enriching the context so as to fulfil MAT's requirement. Let us go back to the 'rent' example. The biased context in (4) explicitly contained the information that the computer system of the bank was down, and this is enough to activate the non-canonical reading of the question. In the neutral context in (3) (where Maria was meant to be genuinely

interested in knowing the answer to her question), the presupposition (that Maria believes that she expects that no option to pay the rent is viable) is not immediately satisfied. However, we know that presuppositions can sometimes be accommodated (Karttunen, 1974; Lewis, 1979; von Fintel, 2000, 2008; among many others): in example (3), it is sufficient to enrich the scenario with additional information (e.g., Maria is skeptical about the idea that they have enough money to pay the rent) to render it a biased context supporting a non-canonical reading of the question.

Notice that if MAT's presupposition is accommodated in scenarios that do not explicitly support it, we expect that MAT will be judged appropriate in those cases. This hypothesis is compatible with what Domaneschi and Di Paola (2018) report: they presented presupposition triggering sentences (such as *Gaia gave up smoking*) in two contexts, a supporting one, where the information later presupposed was explicitly introduced (*Gaia used to smoke ten cigarettes per day*), and a neutral one, when this information had not been introduced. Participants were asked to indicate whether the presupposition was true (i.e., whether Gaia used to smoke), and found that, albeit to a lower rate compared to supporting contexts, in neutral contexts participants responded affirmatively 75% of the times, with extremely high variation among presuppositional triggers (with percentages of positive answers ranging from 45% for focus particles like *also* to 96% for change of state verbs such as the aforementioned *give up*), tracking the distinction between soft and hard triggers introduced in the theoretical literature (cf. Abusch, 2010). Domaneschi and Di Paola interpret these data as evidence of accommodation of the presupposed information. As we saw, how easily a presupposition can be accommodated depends in part on the nature of the trigger, but we also expect some variation among speakers depending on how easy they find the accommodation process.

To further explore this hypothesis, we administered a second study with the same experimental materials in which participants were asked to rate the acceptability of the gesture in the given scenarios using a 7-point scale instead of a forced binary judgment that might have triggered an accommodation strategy in some of the participants. In line with Schwarz and Tiemann's claim that "acceptability is clearly a gradient notion that is affected by a host of factors, including nonlinguistic ones", and that in particular "felicity affects acceptability, with a decrease in felicity leading to a decrease in acceptability" (Schwarz and Tiemann, 2017, footnote 18 on p. 79), we conjectured that a gradient scale of acceptability might better capture the infelicity of MAT in neutral contexts.

3. Study 2

In the second study, participants were asked to express a gradient judgment of acceptability for gestures (including MAT) against different scenarios. We hypothesized that if MAT triggers the presupposition of the non-canonicity of the question, MAT will be evaluated as perfectly acceptable in biased contexts (in which that presupposition is indeed satisfied); MAT in neutral contexts, on the other hand, is expected to receive intermediate acceptability scores, patterning like other kinds of presuppositions failures.

Is the MAT gesture compatible with canonical questions?

3.1. Method

Materials and the procedure were the same as in Study 1, the only difference was the participants' task: instead of indicating whether the gesture was appropriate or not appropriate, they had to rate the naturalness of that gesture in the given scenario, using a 7-point scale in which the annotated scores on the scale were: 1 (not natural at all), 4 (a little bit weird but acceptable), and 7 (perfectly natural).

A total of 101 (91 female) Italian university students with a mean age of 23 years (age range 18-39) took part in the study. Four participants were excluded because they were not born in Italy, so the final analyses include 97 participants.

3.2. Results

The ratings' distribution for the MAT and the filler items are plotted in Figure 3, split by the type of context that preceded the gesture. As expected, participants gave high ratings when the filler gestures were appropriate (matching) in the context and low ratings when they were inappropriate (mismatching). In the case of MAT, participants gave higher ratings when the MAT gesture appeared in a biased context compared to a neutral one.

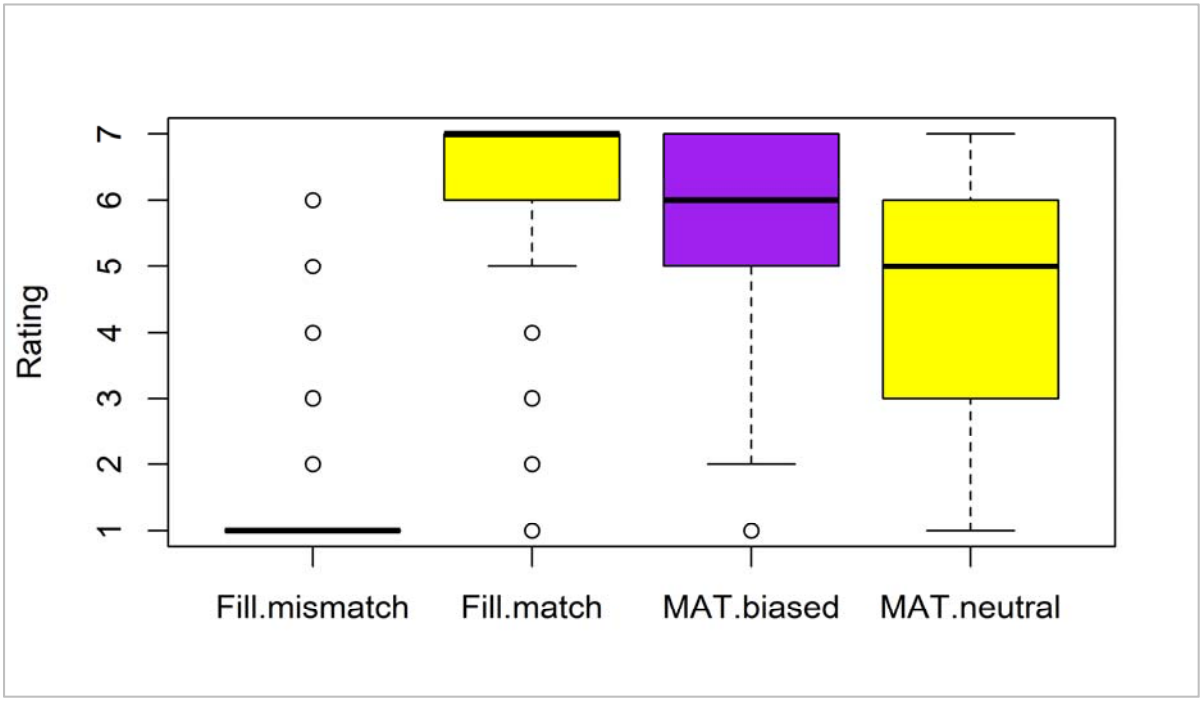

Figure 3. Ratings' distribution on the 1-7 Likert scale for Filler items (left) and MAT items (right), depending on type of context.

To test our experimental hypothesis, we focused on the contrast between the ratings of the MAT gesture in the two conditions, in order to evaluate if the type of question (neutral vs. biased) that was accompanied by MAT affected the participants' ratings of the appropriateness of such gesture in the two conditions. As shown above, it is evident that MAT in conjunction

with a neutral, information seeking question, was rated worse than in conjunction with a biased question. To evaluate this contrast statistically, we implemented a mixed-effects ordinal regression model with a logit link function, using the clmm() function in the ordinal package (Christensen, 2018). This analysis is specifically designed to treat ordinal dependent measures, as is the case with the Likert scales used in our study. The model included condition (neutral vs. biased context) as a fixed effect and subjects and items as random intercepts (including random condition slopes for subjects and items resulted in a failure of convergence). The analysis revealed that the ratings of MAT accompanying a biased question were significantly higher than the ratings of MAT accompanying a neutral question (*estimate* = -2.6747, *SE* = 0.2613, z = -10.24, $p < .0001$), confirming our predictions.

To better understand the middle ratings observed for the MAT gesture accompanying a neutral context, we further inspected the distribution of participants and items across conditions. As it is evident in Figure 4, participants were in general consistent with their judgments across items, and no hint of bimodal distribution was revealed. We will go back to this point in the discussion section.

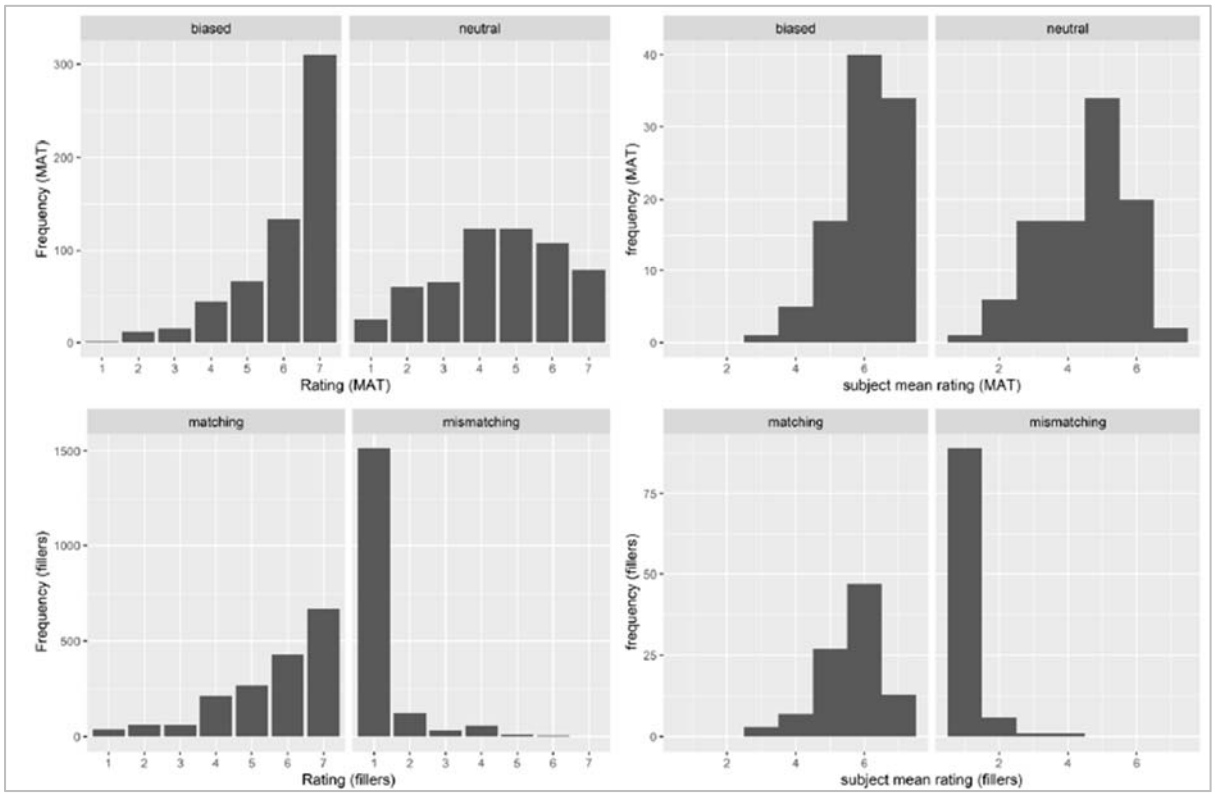

Figure 4. Top panels show the distribution of individual ratings (left) and the distribution of subject means (right) for MAT items. Bottom panels show the same for filler items. Note that frequency is based on 36 items in the case of fillers and 12 items in the case of MAT, and this explains the difference in the scale between top and bottom panels.

3.3. Discussion

In Study 2, we confirmed that MAT in biased contexts is rated as perfectly acceptable, in line with the at-ceiling ratings of Study 1. We also confirmed that MAT is judged to be less acceptable in neutral contexts, even if the ratings were higher than mismatching fillers. By inspecting the individual responses, it emerged that the intermediate ratings (median of 5 on a scale that ranged from 1 to 7) were due to the fact that most of the participants assigned middle values and not, as discussed in Study 1, to the fact that participants were bimodally distributed with some participants assigning high values and others opting for low values. As discussed above, a truly bimodal distribution of values would be compatible with the ambiguity hypothesis: some participants would be disambiguating in favor of the canonical question reading of MAT (thus assigning high scores of acceptability), while others would be disambiguating in favor of the non-canonical question reading (sanctioning the infelicity of the questions with low scores). However, we found consistent intermediate ratings. This is indeed compatible with the pattern found in other cases of presuppositional failures. Tiemann et al. (2011) report intermediate ratings on a scale 1-4 for cases of unsupported presuppositions, with decreased acceptability ratings compared to fully acceptable sentences but higher ratings compared to semantically odd sentences. Similarly, Schwarz and Tiemann (2017) found that, even though the infelicitous use of presuppositional statements involving German *wieder nicht* 'again not' and *nicht wieder* 'not again' presented in an unsupporting context are rated as less acceptable than felicitous uses in satisfying contexts, their scores (2.63 and 2.64 on a scale ranging from 1 to 5) are not at floor. Commenting on these results, Schwarz (2019) concludes that "while there is some cost associated with accommodation, the associated decrease in acceptability is only a moderate one".

4. General Discussion

In this paper, we contributed behavioral data on the semantics of co-speech Mano a Tulipano (MAT), a gesture extensively used by native speakers of Italian, which typically accompanies interrogative speech acts. The contribution of co-speech gestures to the overall meaning of the speech act is debated, and researchers disagree with respect to which dimension of meaning co-speech gestures contribute to. While there is some agreement that they do not contribute to the assertoric content of the utterance, the nature of this non-assertoric content is debated. Specifically, some theories have argued that co-speech gestures contribute supplements (Ebert and Ebert 2014), while other theories have argued that co-speech gestures may contribute presuppositions (co-suppositions). Within the scope of formal semantics and pragmatics, these previous studies have focused on gestures conveying lexical material associated with some specific constituents of the sentence: for example, the gesture UP (index finger pointing up) co-occurs with the words *use the stairs* in Schlenker (2018) and it is argued to add the co-supposition that, if *x* uses the stairs, *x* uses the stairs to go up. Our investigation of MAT expands the domain of inquiry to include a gesture – MAT – that does not add information about any sub-sentential constituent but rather modifies an interrogative sentence.

While it is uncontroversial that MAT has a question meaning, there is no consensus on what kind of question is conveyed or marked by this gesture. According to some accounts, co-speech MAT is ambiguous and can occur with both canonical and non-canonical questions. According to presuppositional accounts, MAT contributes to the non-at-issue meaning of the question,

thus making the prediction that it is fully compatible with non-canonical questions only. To test this hypothesis, we conducted two acceptability judgment studies in which the participants' task was to evaluate the appropriateness of the MAT gesture associated to two types of questions: a canonical question, and a non-canonical (biased) question. Study 1 was a binary forced-choice sentence evaluation task, Study 2 was a gradient acceptability judgment study. The aim was that of testing if and at which rate Italian participants accepted the MAT gesture accompanying canonical questions, i.e., a context in which, according to the presuppositional account of MAT, the presupposition is not satisfied.

Two main findings are worth discussing. First, both studies showed that in biased contexts (in which MAT's presupposition is satisfied) MAT was fully accepted and rated as perfectly natural. Second, and more importantly, both studies showed that MAT was evaluated differently in neutral contexts: Study 1 showed that MAT in neutral contexts was judged acceptable significantly less than in biased contexts, whereas Study 2 showed that in neutral contexts MAT received intermediate acceptability scores (unlike in biased contexts where ratings where at ceiling). These findings are compatible with Ippolito's theory of MAT: only when the presupposition that the question is non-canonical is satisfied, MAT is fully acceptable; when this presupposition is not supported by the context (which requires a canonical question), judgments on MAT were more variable across participants when a binary judgment was requested (as in Study 1); on the other hand, MAT received intermediate ratings by all the participants when a gradient judgment was required (as in Study 2). Interestingly, the ratings of MAT accompanying canonical questions in both studies were higher than the ratings of gestures that were unequivocally at odds with the content of the question they accompanied (e.g., when the gesture for money was used in a context that had nothing to do with money, or money-related concepts), a result also consistent with previous experimental studies on presuppositions. By testing different materials and by means of different experimental paradigms, previous studies (e.g., Schwarz et al., 2011; Schwarz and Tiemann, 2017) have reported intermediate ratings for cases of unsupported presuppositions, with decreased acceptability ratings compared to fully acceptable sentences but higher ratings compared to semantically odd sentences, compatibly with what we observed in our Study 2 in particular. Other studies (e.g., Domaneschi and Di Paola, 2018) also show evidence of automatic accommodation of the presupposed information, with some variability depending on the presuppositional trigger.

Following up on this literature, we interpret our findings as compatible with a presuppositional account of MAT. We also argue that these findings, especially those of Study 2, are hard to reconcile with an ambiguity account, since genuine intermediate ratings are not typically associated with ambiguous phenomena: variability, in this case, might be observed between different participants, depending on the resolution of the ambiguity *per se* (specifically, high scores are predicted if the matching meaning is activated, low scores otherwise), but not across participants which is what we found in our second study.

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