

Recovering gestured and spoken material in VP ellipsis and pro-forms¹.

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Abstract. This contribution is concerned with the at-issueness status of co-speech gestures expressing manner modification. While such gestures are typically considered to be non-at-issue, they can be made to be at-issue by the German demonstrative intensifier *SO*. We discuss the potential of an anaphoric relative of this intensifier, *so* in *so do* pro-forms, to shift the content of a co-speech gesture to at-issue status. We propose a formal analysis along the lines of Ebert et al., 2020, and sketch the design for an acceptability judgment experiment to test our predictions.

Keywords: co-speech gestures, manner modification, VP ellipsis, pro-forms, at-issueness.

1. Introduction

Co-speech gestures often contribute semantic content that modifies only a part of a spoken utterance. A prototypical example of this is the following:

- (1) a. I brought a bottle to the talk.



(Photo: Jörg Carstensen, DPA)

Here, the gesture contains information that modifies the NP *bottle*, i.e. that the bottle was of a certain (vertical) size. The literature on gestures modifying both nouns and verbs is large and still growing (cf. Ebert and Ebert, 2014; Schlenker, 2014; Schlenker, 2018; Esipova, 2019; Sailor and Colasanti, 2020; and Ebert et al., 2020). (2) below gives an example for a co-speech gesture modifying an event expressed by a verb.²

- (2) The president will leave soon +*ROTATING*gesture.

In this contribution, we will have a closer look at how modification by co-speech gestures can be analysed, and what the data tell us about what has been termed the *gesture projection problem*: the question whether the semantic contribution of co-speech gestures is (always) non-at-issue. More specifically, we intend to address three research questions:

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²The “ROTATING” gesture is an upward spiral movement with the index finger pointing upwards, signifying, as it were, a helicopter as a mode of transportation. In what follows, we will give the description of the gesture in CAPs in the subscript of the underlined expression; this is intended as indicating that the gesture is co-present with the underlined expression.

1. What is the status of gestured adverbial modifiers? In particular, what is the at-issueness status of gestured manner modification?
2. What is the role of *so* in anaphoric pro-forms, and how do these pro-forms relate to VP ellipsis (VPE)?
3. How are spoken and gestured manner modification related to each other in elliptical contexts?

Everything we will have to say below comes from work in progress, but we will nevertheless attempt to provide the following preliminary answers to our research questions (all of them pending empirical validation by controlled experimentation).

1. Gestured adverbial modifiers, just like gestured adnominal modifiers, are typically non-at-issue.
2. Anaphoric *so* in *so do* pro-forms picks up gestured adverbial modification and assigns it at-issue status.
3. Gestured manner modification behaves like high manner modification in spoken English: it is typically non-at-issue.

Given that the introspective judgment data on the pertinent examples seem to be rather murky, we will provide a sketch of an experimental design in which questions as the ones given above can be addressed experimentally. The contribution is organised as follows: we first give a short introduction to modification by co-speech gestures (section 2). This is followed by a presentation of the crucial data patterns concerning adverbial modification in VP ellipsis and pro-forms (section 3). Section 4 presents our analysis. Section 5 sketches the experimental design of a planned experiment. Section 6 sums up and concludes.

2. Modification by co-speech gestures and at-issueness

For examples as the one in (1a), Ebert and Ebert (2014) and Ebert et al. (2020) argue that modification by co-speech gestures adds descriptive content to the utterance, but only to the non-at-issue level. This can be shown by tests probing the at-issueness status of the modifying part of the utterance. Here, we will only look at the **direct denial test** (cf. Amaral et al., 2007); two further tests, the negation test and the direct affirmation tests, show the same results. These data show that, while the descriptive content of the gesture is part of the meaning conveyed by the utterance, it cannot be denied directly:

- (3) A: I brought a bottle_{+SIZE_{gesture}} to the talk.
 B: That's not true. You didn't bring a bottle.
 B': #That's not true. The bottle was small.

While the reply given by B is perfectly natural, the reply given by B' is somewhat odd: the attempt to reject the content provided by the co-speech gesture seems to result in a pragmatic infelicity. This is in sharp contrast to the contribution of adnominal modifiers in the spoken/written modality, which is directly deniable:

- (4) A: I brought a large bottle to the talk.

B: That's not true. You didn't bring a bottle.

B': That's not true. The bottle you brought was small.

Here, both rejecting utterances are felicitous. If we now take a look at event modification by co-speech gestures, it seems that it follows the pattern of adnominal modification:

(5) A: Peter shut the window+*SLAMMINGgesture* in the kitchen.

B: No, that's not true. He shut the window in the bedroom.

B': # No, that's not true. He shut it very carefully.

Again, the utterance by B' attempting to reject the content of the modification contributed by the gesture results in infelicity. Compare this to the spoken/written variant:

(6) A: Peter shut the window in the kitchen loudly.

B: No, that's not true. He shut the window in the bedroom.

B': No, that's not true. He shut it very carefully.

Thus, it seems that event modification in the spoken/written modality is directly deniable, while event modifiers provided by means of gestures are not. This seems to indicate that the content contributed by co-speech event modifiers is generally non-at-issue. However, modification by gestures can be shifted to at-issue status by a demonstrative element (in German: *SO*; in capitals because it is accented; s. Ebert et al., 2020 for the relevant details):

(7) Ich habe SO eine Flasche+*BOTTLEgesture* zum Vortrag mitgebracht.
I have such a bottle to-the talk brought.
'I brought such a bottle to the talk.'

In reply to an utterance as the one in (7), one can directly reject the contribution of the gestured modifier:

(8) A: Ich habe SO eine Flasche+*BOTTLEgesture* zum Vortrag mitgebracht.
I have such a bottle to-the talk brought.
'I brought such a bottle to the talk.'

B: Das stimmt nicht. Die Flasche war kleiner.
That pitches not. The bottle was smaller.
'That's not true. The bottle was smaller.'

Similarly, the contribution of a co-speech gestural event modifier can be addressed directly in a response if the modifier exhibits the demonstrative intensifier *SO*:

(9) A: Peter hat die Tür in der Küche SO+*SLAMMINGgesture* geschlossen.
Peter has the door in the kitchen SO+*SLAMMINGgesture* shut.
'Peter has shut the door like this'+*SLAMMINGgesture*.'

B: No, that's not true. He shut it very carefully.

From this, Ebert and Ebert (2014) conclude that modifying content supplied by co-speech gestures is non-at-issue, but that in German, it can be *shifted* to be at-issue content by using accented *so*; German *SO* is a dimension-shifter. (But see Esipova, 2019, for a different view).

This raises the question whether other uses of *so* also have the potential to shift the at-issueness status of co-occurring content. To provide an answer to this question, we will have a look at the role of *so* in elliptical constructions.

3. Adverbial modification in verb phrase ellipsis and pro-forms

A further test for the at-issueness of a piece of content is whether it is obligatorily recovered under ellipsis (cf. Potts, 2005); if it is, it must be at-issue:

- (10) Peter shut the window_{+SLAMMING_{gesture}}, and Paula did [], too.
 ~> Paula may have also slammed the window shut, or closed it in a more careful fashion.

The content of the gestured adverbial modifier (roughly: *in a slamming fashion*) seems to be non-at-issue in (10), because it is not obligatorily recovered in the second conjunct. (It is also not directly deniable, as the readers may check for themselves). In a recent talk, Sailor and Colasanti (2020) also discuss the recovery of gestured content in ellipsis, citing the following example of Schlenker's.

- (8) Context: *I had two guys standing in front of me, one of them very short and the other one very tall.*



The tall one allowed me to remove his glasses, but the short one didn't [-].

→ The short person's glasses were high up

(from Sailor and Colasanti, 2020: p. 4)

Here, too, the gestured modifying content (that the guy's glasses were high up) is not recovered in the interpretation of the ellipsis; arguably, because it is non-at-issue. A similar point has been put forward in Esipova, 2019: 167, employing an example which features an adverbial modifier and which we slightly adapted to our notation:

- (11) [Context: *Zoe and Kim are participating in a multi-sport competition. For the shooting part of the competition, participants had to choose a longbow or a gun and then shoot at the target.*]

Zoe has already shot at the target_{LONGBOW_{gesture}}, but Kim hasn't. (her ex. 7.3.b.ii)

Again, Kim's shooting at the target does not have to be carried out by using a longbow. Thus, the modifying content supplied by the gesture is not obligatorily recovered in the interpretation of the ellipsis; see Moulton (2019) for possible syntactic and processing explanations, as well as experimental evidence for what he calls "the small-antecedent effect".

The generalisation seems to be that the content contributed by co-speech gestures of this kind is ignored under ellipsis because it is non-at-issue, or, following Moulton's line of thinking: because it can be ignored since it does not belong to the smallest antecedent.

Interestingly, a close relative of verb phrase ellipsis, *so do* pro-forms, seem to be exempt from the smallest antecedent effect:

- (12) Peter shut the window_{+SLAMMING_{gesture}}, and so did Paula.
 ~> Paula also slammed the window shut.

In (12), the content of the modifier seems to be obligatorily recovered in the interpretation of the ellipsis site; this speaks in favour of its being at-issue information in the second conjunct. This is paralleled by the following data from the spoken/written modality:

- (13) a. Eddy quietly sang the song and Fred did too. (=Moulton's (2019) ex. (9.a))
 b. Eddy quietly sang the song, and so did Fred.

According to Moulton, (13a) is ambiguous between a reading where Fred also sang the song quietly, and an unmodified one, where he just sang the song, in whichever way. Although judgments from our native-speaker informants vary to some extent, most of them agree that (13b), in contra-distinction to (13a), has a highly preferred reading where Fred also sang the song quietly, while (13a) is ambiguous between the two readings. That is, in (13b), the content of the manner adverb in the first conjunct is targeted by the pro-form.

Thus, it seems that both the gestured adverbial modifier, as well as the high adverb in spoken/written form, have to be recovered obligatorily in the *so do* pro-form, but not in verb phrase ellipsis. This raises the question as to how we can explain that the pro-form seems to pick up on the modified event description, and that it seems to be exempt from the small-antecedent effect.

4. Recovering manner modification in pro-forms: a sketch of the analysis

The data pattern we have presented in the previous section is completely based on introspective judgments by approximately 10 native informants. This calls for experimental corroboration. With this being said, we will—for the time being—assume the following ingredients for an explanation:

- (A) The *so* of English *so do* pro-form is an anaphoric cousin of the German demonstrative *SO* described in Ebert and Ebert, 2014; see also Umbach and Gust, 2014: anaphoric *so* takes the event description from the first conjunct as its antecedent (see also Landman and Morzycki, 2003).
- (B) The subject of the *so do* pro-form bears a focus feature and replaces the AGENT of the antecedent event description.
- (C) Movement of *so* to SpecCP results in an inverted structure in which the focal subject is clause-final (cf. Déchaine, 1994).

We will go through these ingredients in turn.

Ingredient A: The assumption that the contribution of *so* is anaphoric is shared by most authors (cf. Bouton, 1970; Houser, 2010; and Landman and Morzycki, 2003).

- (14) a. Peter shut the window_{+SLAMMINGgesture}, and Paula did, too.
 b. Peter shut the window_{+SLAMMINGgesture}, and so did Paula.

We can bring the anaphoric nature of the *so* pro-form to the fore by paraphrasing (14b) by means of a clearly discourse deictic *that*, thus highlighting the role of the event antecedent:

- (15) Peter [shut the door in a vehement fashion]_{*i*}, and **that_{*i*}**'s what Paula did, too.

To account for the data in (14a) and the pro-form in (14b), we adopt Ebert and Ebert's (2014)

unidimensional dynamic framework, which is based on Anderbois et al., 2013. Here, discourse referents x, y, z, \dots are individual concepts of type $\langle s, e \rangle$. We distinguish between at-issue and non-at-issue contributions by way of introducing two distinct propositional variables, p and p^* . These variables help to keep track of the meaning contributions of at-issue and non-at-issue material, respectively. The at-issue proposition (p) can be regarded as a proposal by the speaker to update the context set, and the non-at-issue proposition (p^*) is silently imposed and not open for discussion (see Anderbois et al., 2013). In (14a) and (14b) the gesture g that stands for a manual gesture of a window-slamming event introduces an individual concept for such an event. The temporal alignment of the gesture and the speech VP *shut the window* triggers a similarity condition $SIM_{p^*}(e, z)$, which requires that the event e of the spoken modality (i.e. shutting the window) needs to be similar in contextually relevant ways to the event z of the gestural modality (which is g and hence an event of slamming a window). Crucially, this similarity condition is non-at-issue, in other words: it restricts the propositional variable p^* and not p . In the case of (14a), the VPE, this non-at-issue information can be neglected in the ellipsis. In the case of (14b), the pro-form, the gesturally introduced semantics has to be picked up in the pro-form and shifted to the at-issue dimension, hence $SIM_p(e', z)$ is added to the formula. See Anderbois et al. (2013), for details of the formal apparatus to account for interactions of at-issue and non-at-issue semantics in general, Ebert et al. (2020) for interactions of gesture and speech semantics, and Ebert and Hinterwimmer (to appear) for gesture-speech interactions with events in particular.

Interpretation of (14a), VPE:

$$\begin{aligned} & [e] \wedge \text{AGENT}(e, \text{Peter}) \wedge \text{shut-the-window}_p(e) \\ & \quad \wedge [z] \wedge z = \mathbf{g} \wedge SIM_{p^*}(e, z) \\ & \underline{\wedge [e'] \wedge \text{AGENT}(e', \text{Paula}) \wedge \text{shut-the-window}_p(e')} \end{aligned}$$

(where \mathbf{g} is the individual concept that stands for the window-slamming gesture g). The underlined part is the content with respect to which the two constructions differ.

Interpretation of (14b), *so do* pro-form:

$$\begin{aligned} & [e] \wedge \text{AGENT}(e, \text{Peter}) \wedge \text{shut-the-window}_p(e) \\ & \quad \wedge [z] \wedge z = \mathbf{g} \wedge SIM_{p^*}(e, z) \\ & \underline{\wedge [e'] \wedge \text{AGENT}(e', \text{Paula}) \wedge \text{shut-the-window}_p(e') \wedge SIM_p(e', z)} \end{aligned}$$

In the case of the *so do* pro-form in (14b), the similarity relation SIM between the events and the discourse referent for the gesture is at-issue and does not only hold for the antecedent event e , but also for the event e' in the pro-form.

Ingredient (B): We assume, following Déchaine (1994) and López (1995) that the subject of the pro-form bears a focus feature. Since it is the only piece of new information in the second conjunct, it cannot but end up as the focus value of the clause. Arguably, this can be shown by contrasting the *so did X* variant of the pro-form with the non-inverted *so X did* variant; only in the non-inverted variant, where the subject is potentially non-focal due to being in non-final position, can the subject be pronominal:

- (16) a. *Petra promised to do the dishes, and so did she.

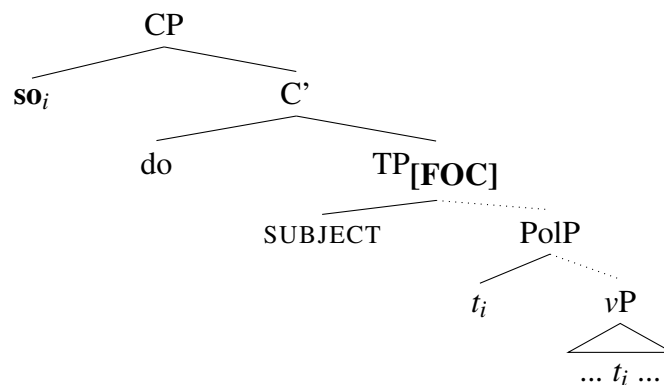
- b. Petra promised to do the dishes, and so she did.

It should be noted that, following Vander Klok and Déchaine (2014), we do *not* assume that the two variants are syntactically related by derivation.

Ingredient C: Although we want to remain agnostic as to what the exact base position of *so* in the inverted pro-form is, we will assume that its base position is somewhere within *vP*. If we assume inverted *so* to be the positive polar variant of the negative polar *neither*, we will have to assume that *so* undergoes movement to PolP. The parallelism between the positive and the negative polarity case seems rather compelling (cf. López, 1995):

- (17) a. Petra finished the test quickly, and so did Paul.
b. Petra didn't finish the test quickly, and neither did Paul.

If we parallelize *so* and *neither*, and assume that the former is anaphoric/discourse deictic, we face the question whether *neither* is anaphoric, too. So far, we have nothing to say on this matter; but see Gajić, 2019 for discussion. The syntactic structure following from these assumptions would look as follows (glossing over details):



(cf. Vander Klok and Déchaine, 2014)

A final point concerns our third research question, i.e., the relation between manner modification by gestures and in the spoken and the written modality. In our example (6) above, repeated below as (18), we showed that manner adverbials in their *vP*-internal base position are directly deniable, and hence contribute to at-issue content.

- (18) Peter shut the window in the kitchen loudly.

It follows quite naturally from our assumptions made above to draw a parallel between gestured manner adverbials, and spoken/written manner adverbs **if they are in a high clause-internal position**: both are non-at-issue, as the following example may show:

- (19) a. Peter loudly shut the window in the kitchen.
b. That's not true, he shut the window in the bedroom.
c. ?/#That's not true, he shut it quietly.

It seems that the manner adverb in high position in (19a) is less accessible for the direct denial in (19c). Regrettably, the data are again somewhat murky: some native speakers consider the direct denial in (19c) felicitous (if somewhat suboptimal). Given this, it does not come as a

surprise that even the experimental evidence available so far in Stevens et al. (2008) and Stolterfoht, submitted, on German data, is not unequivocal. However, the experimental evidence on moved and/or deaccented manner adverbs in the written/spoken modality *does not preclude* the possibility that our analogy between gestured and high spoken/written manner adverbs is on the right track.

5. Recovering gestured and spoken modification: A sketch for an experiment

Given that, as pointed out earlier, the judgments on the pertinent sentences/utterances are far from uniform, it seems reasonable to submit the sentences in question to an experiment that elicits judgments under controlled circumstances. We will give a short sketch of what such an experiment might look like, i.e. its design, hypotheses, and a sample item. There are quite a number of factors involved in a scenario where one wants to test the felicity of direct rejections of sentences containing manner modification, plus an elliptical construction. The most obvious ones are:

- TYPE of modifier (spoken/written vs. gestured)
- POSITION of the spoken modifier (sentence medial vs. sentence final)
- FORM of the second conjunct: VP vs. pro-form
- REJECT: rejection of the VP content of the utterance vs. rejection of the modifier

The first issue an experimental study would have to establish is that there indeed is a difference between the two types of constructions, VPE and pro-form, with respect to the possibility to directly deny the event modification supplied by the co-speech gesture. A sample experimental item in all four conditions (resulting from fully crossing the factors FORM and REJECT) is given in (20a)/(20b) and (21a)/(21b) below.

- (20) a. Peter shut the window_{+SLAMMINGgesture} in the kitchen, and Paula did, too.
 b. But she shut the window very carefully.
 c. But she shut the window in the living room.
- (21) a. Peter shut the window_{+SLAMMINGgesture} in the kitchen, and so did Paula.
 b. But she shut the window very carefully.
 c. But she shut the window in the living room.

Given our take on the data, and the prediction derived from our analysis, we would predict a difference in acceptability between the rejecting continuations in (20b) and (21b): if the recovery of the gestured content is obligatory only in the case of pro-forms (due to the anaphoric *so*), (20b) should be judged as being more acceptable than (21b). Now, given the shakiness of the introspective data, it is perfectly possible that this hypothesis will not pan out, i.e. that there is no difference between the conditions (20b) and (21b). In order to be able to interpret such a potential null result, we intend to include the continuations in (20c) and (21c) as benchmarking conditions. Since the locative modifier *in the kitchen* should be at-issue in both conditions, we predict there to be no difference in acceptability between (20c) and (21c). In case we do not find a difference between the (b)-conditions, either, this null effect could be interpreted nonetheless. However, our alternative hypothesis predicts a hybrid interaction between the factors REJECT and FORM, which should look as shown in Figure 1.

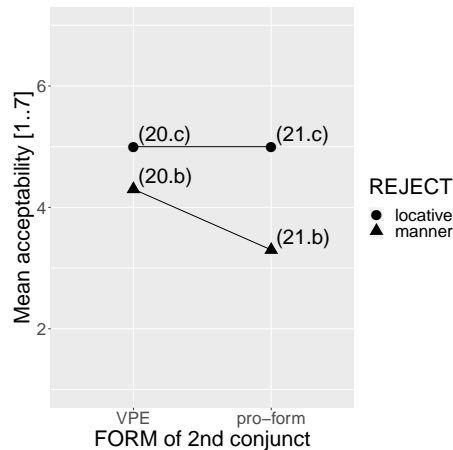


Figure 1: Prediction for mean acceptability dependent on FORM and REJECT

If we do indeed find this pattern, a possible follow-up experiment would have to address the question whether the content contributed by co-speech gestures behaves similarly to the content contributed by high manner adverbs (thus addressing the factor TYPE above). And although Stolterfoht (submitted) does report a null effect for the factor POSITION (high vs. low manner adverb) for written stimuli in German, it would perhaps be worth a further experiment to test whether

- (i) English stimuli do not show the effect, either; materials would have to be carefully controlled for at-issueness, though, possibly by adding an overt QUD of the form *Which door did Peter shut loudly?*, thus rendering the manner modification non-at-issue; and
- (ii) the high manner adverbials in the written modality vs. in the gestural modality show the same (or at least: a similar) acceptability profile with respect to the direct denial second conjunct (again, VPE vs. pro-form).

There is at least one further factor coming to mind: the prosody of the first conjunct in the case of spoken stimulus presentation; i.e., is the manner adverb (in high or low position) accented or deaccented (*...loudly shut the [DOOR]_F* vs. *...[LOUDLY]_F shut the door*; s. Eckardt, 2003; Schäfer, 2003, and Schäfer, 2013). Stevens et al. (2008) found clear effects of prosody on the deniability of manner modifiers; but they only tested sentence-final accented vs. deaccented manner adverbs, where the deaccentuation was induced by having the subject bear a contrastive focus. To learn more about the recoverability of elided content, be it spoken/written or gestural, it might be informative to observe the effects on deniability if the factors POSITION and PROSODY are fully crossed.

6. Conclusion

We have presented a set of data which speaks in favor of the view that content contributed by manner modification in terms of co-speech gestures is typically non-at-issue, and, accordingly, is ignored under ellipsis. We have further argued that the *so* in *so do* pro-forms makes the content of an event-modifying gesture at-issue, due to the anaphoric nature of *so* in this case, obligatorily recovering the complete event as antecedent. In contrast, verb phrase ellipsis does not make the complete event recoverable: in VPE, the content added by a gestural manner

modification may be ignored. We have provided a formal analysis of these claims along the lines of Ebert et al. (2020), and derived a hypothesis for a controlled acceptability experiment testing for the effects so far only reported on the basis of introspective judgments.

In addition to conducting the actual experiment, which is on its way, there remain a number of questions concerning the factors involved in the phenomenon we have looked at here. Among them is the question of how prosody might interact with gesture; of particular interest might be cases in which a gesture is aligned with focussed material with which it does not share content; furthermore, the question whether German ... *und DP ebenso* behaves similarly to English *so do DP* pro-forms; and whether other types of co-speech phenomena have the potential to modify spoken/written events.

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