

## Musical gestures in the typology of linguistic inferences

Schlenker 2018a argues that pro- and post-speech manual gestures make it possible to replicate with iconic means most of the inferential typology of language, including implicatures, presuppositions, supplements and 'homogeneity inferences' characteristic of definite plurals. Tieu et al. 2018 confirm these generalizations with experimental means, and extend them to hybrids of written words and visual animations (replacing gestures). Guerrini&Schlenker 2018 further extends the results to vocal gestures (onomatopoeias). Independently, it has been argued (Schlenker 2018b) that music can trigger semantic inferences. Putting these paradigms together, we suggest that musical stimuli can replace pro- and post-speech gestures, and trigger the same four inferential types. In other words, musical stimuli can behave as 'musical gestures'. At this early stage, introspective results are clear with scalar implicatures, presuppositions, and homogeneity, and more tentative with supplements.<sup>1</sup>

We base our conclusions on (i) the introspective judgments of the authors on French and Italian versions of the sentences, and (ii) the judgments of two further French informants. We provide English versions for ease of exposition, but the French translations we used on informants can be found [here](#). Each utterance was produced orally, with musical stimuli played by a computer at the appropriate time. Informants were asked to rate the strength of endorsement of the target inferences on a scale from 0 to 10.

[1] A direct **scalar implicature** arises in (1), modeled after Tieu et al. 2018: a single iteration of [PERCx1](#)<sup>2</sup> is indicative of a single punching event. We argue that this is because it means 'to punch' but competes with the repeated version [PERCx4](#), realized by 4 unpunctuated (i.e. hard to separate) iterations. An alternative analysis is that [PERCx1](#) just means 'to punch once'. But this makes incorrect predictions for (2)b, which doesn't deny that Jenny will do exactly one punching, but rather that she will punch at all. In addition, (2)a is a clear case of an indirect implicature: *not* [PERCx4](#) competes with the more informative *not* [PERCx1](#), which is taken to be false - hence the inference that Jenny will do some punching.

(1) **Context:** John the Alien has been training on the punching bag at the gym. // At last week's workout, John had a lot of energy. He was able to [PERCx4](#).

a. This week, John will [PERCx1](#). => John will punch somewhat but not a lot.

b. This week, John will [PERCx4](#). => John will punch a lot

(2) **Context:** Jenny the Alien has been training on the punching bag at the gym. // In her first week of training, Jenny had a lot of energy. She was able to [PERCx4](#). But in the second week, Jenny did not [PERCx1](#).

a. This week, Jenny will not [PERCx4](#). => Jenny will punch somewhat but not a lot.

b. This week, Jenny will not [PERCx1](#) => This week, Jenny will not punch at all.

[2] **Presuppositions** can be generated by musical gestures that evoke changes of state: an upward scale playing with a harp (i.e. the succession of notes of higher and higher frequencies) evokes a ball being kicked up, while a downward scale played in the same conditions rather evokes a ball being kicked down. Strikingly, in both cases the initial state (being down/being high) is presupposed. This is shown by classical projection tests: the presupposition projects out of a modal (3)(a), question (3)(b) and 'none' environment (3')(c).

(3) **Context:** A group of ten friends is playing. Five of them of them are on the ground, five are on a tree, and they are throwing a ball back and forth.

a. The children might (i) [UPWARD SCALE](#) / (ii) [DOWNWARD SCALE](#).

=> The ball is (i) on the ground (ii) in the tree.

b. Do you think the children will (i) [UPWARD SCALE](#) / (ii) [DOWNWARD SCALE](#)?

=> The ball is (i) on the ground (ii) in the tree.

(3') **Context ('none' environment):** A group of ten friends is playing. Five of them of them are on the ground, five are on a tree, and they are throwing five balls in predetermined pairs.

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<sup>1</sup> While some stimuli are from 'real' music, we leave open whether these inferential types are used in language-free music.

<sup>2</sup> Any music stimulus can be listened to by directly clicking on its label. If the reading does not work directly, please use the "Open with Music Player for Google Drive" option at the top of the window.

- c. None of the children will (i) [UPWARD SCALE](#) / (ii) [DOWNWARD SCALE](#).  
=> Each of the balls is (i) on the ground (ii) in the tree

Thus change of state musical gestures can productively trigger presuppositions, in line with some proposals (e.g. Abrusán 2011) about presupposition triggering in general.

[3] Tieu et al. argue that post-speech gestures trigger **supplements**, and they provide a partial, inferential argument. We replicate their result with a musical excerpt drawn from Mussorgsky's "Pictures at an exhibition: Ballet of Unhatched Chicks." (4)a is a baseline with a standard supplement, which gives rise to a conditional inference. (4)b has a post-speech musical gesture that exemplifies how the excitement will take place. It too gives rise to a similar conditional inference, which is absent from the at-issue control in (4)c with a 'like this' modifier.

- (4) **Context:** Jerry is a farmer and has to pick up his chickens' eggs every morning, but sometimes the chickens are not quite cooperative.
- If the chickens are excited, which involves jumping everywhere, it will be hard for Jerry to pick up eggs. => if the chickens are excited, this will involve jumping everywhere.
  - If the chickens are excited – [CHICKS](#), it will be hard for Jerry to pick up eggs. => If the chickens are excited, this will involve some jumping.
  - If the chickens are excited and behave like this – [CHICKS](#), it will be hard for Jerry to pick up eggs. => If the chickens are excited, this will not necessarily involve jumping.

Similar judgments were obtained with another context that involved [BAD SCALE](#), modeling a student irritating her piano teacher by playing clumsily on purpose.

[4] **Homogeneity** (see Kriz & Spector, 2017) is a special inferential type triggered by definite plurals, which behave like (quasi-)universals in positive contexts and (quasi-)existentials in negative contexts. Thus *Rob found his presents* means that *Rob found all his presents*, whereas *Rob didn't find his presents* means that *Rob didn't find any of his presents*. Tieu et al. provide evidence that homogeneity inferences can be triggered by purely gestural means, but their paradigm relies on gestural loci (modelled after sign language loci) to obtain a definite reading. Loci are hard to replicate with acoustic stimuli and we thus develop a different argument, based on the observation that a repeated sound (evocative of a plural, as in gestures) can have not just indefinite but also definite readings. Specifically, we submit that a homogeneity inference arises in (5)a. In(5)a, we obtain an inference that the three music instruments will play. This could be because the second occurrence of [W1...W2...W3](#) (i) is interpreted as an indefinite ('three wind instruments'), or (ii) is interpreted as a definite plural ('the [three] wind instruments'). But (i) incorrectly predicts that (5)b should mean something too weak, i.e. that not all three instruments will play (hence two or less might). (ii) makes the correct prediction, combined with the observation that definites under negation give rise to an existential reading.

- (5) **Context:** The orchestra has four instruments today: [W1...W2...W3](#) and [P1](#), and the conductor can choose who will play.
- The conductor decided to let [W1...W2...W3](#) play. => All wind instruments played.
  - The conductor did not make [W1...W2...W3](#) play. => None of the wind instruments played.

Informants gave judgements in line with our predictions, with the following average rates of endorsement: 7.875 for scalar implicatures, 8.75 for presuppositions, and 9.5 for homogeneity inferences. Similarly, in supplements, high scores (8,5 on average) were given for target inferences by the two informants but only by one for the corresponding control inferences. By contrast, the other informant reported very limited acceptability rate for the same control inferences. While this needs further explanation, we note that a similar problem was faced in Tieu et al for the very same control inferences in supplements.

#### References

- KRIZ, M.; SPECTOR, B., 2017, "Interpreting Plural Predication: Homogeneity and Non-Maximality". [lingbuzz/003458](#), Manuscript, IJN.
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