Flexible Expectations of Speaker Informativeness Shape Pragmatic Inference

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Human communication relies on shared expectations between speakers and hearers.[1] One source of such expectations is the Cooperative Principle (CP) and a set of maxims that state that interlocutors form their utterances such that they are true (Maxim of Quality), informative (Maxim of Quantity), relevant (Maxim of Relevance), and clear (Maxim of Manner).[2] Because people expect speakers to follow these maxims, they will often pragmatically enrich the literal semantic meaning of an utterance that appears to be in violation of the CP, making an inference about what the speaker intended. For example, a sentence like "Some of my dogs bark" appears to violate the Maxim of Quantity: it is under-informative, because the speaker used the weaker term in a logical scale ('some') when s/he could have used the stronger, more informative term ('all'). When comprehending this utterance, the listener typically assumes that the speaker did not intend the literal semantic meaning ("At least one (and possibly all) of my dogs bark.") Instead, the listener is likely to derive a scalar implicature (SI), inferring that the speaker intended to convey "Not all of my dogs bark."

Properties of the speaker are known to affect whether listeners compute SIs. For instance, individuals are less likely to derive an implicature from under-informative 'some' statements if they are led to believe, through prior linguistic context, that the speaker is not knowledgeable.[3] There is also some evidence that listeners can adapt to speaker-specific use of 'some' and 'many' to refer to various quantities of objects.[4] Do listeners also form expectations about speaker meaning based on the fact that the speaker belongs to a *group* of speakers without any need for an adaptation period or additional context? In other words, are pragmatic expectations flexibly and immediately updated according to the (group) identity of a speaker, or are they only altered on a person-by-person basis?

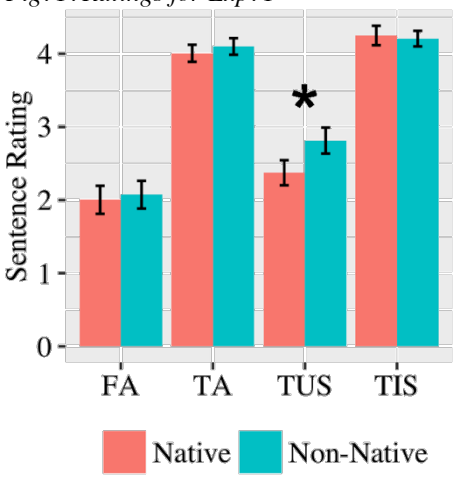
We make the first investigation into speaker-group expectations in SI processing by comparing under-informative utterances spoken by native speakers to those spoken by non-native speakers, who may be assumed to be less pragmatically competent. We take our inspiration from research showing that foreign-accented speech affects neural responses to syntactic[5] violations, with P600 responses attenuated in response to violations produced by a non-native speaker. If the prior expectations that guide syntactic processing also extend to higher-order language processing, under-informativeness may be accepted to a greater extent (with SIs possibly being derived less frequently) for non-native speakers, who might be expected to lack the full arsenal of pragmatic tools available to native speakers. In Exp. 1, we investigate how the accent of a speaker affects the final interpretation of an under-informative utterance, and in Exp. 2 we focus on SI computation specifically.

Exp. 1. English monolinguals (*N*=60) listened to a block of 40 sentences spoken by a female native speaker of English and a block of 40 sentences spoken by a female Mandarin Chinese-accented speaker (order counterbalanced). Sentences fell into four within-subjects types (Table 1). Participants rated each sentence on a scale from 1 (very bad) to 5 (very good). For the critical Under-Informative Some sentences, a high rating is indicative of a logical interpretation of 'some' ('at least one'), whereas a low rating indicates that a SI has been derived.

Table 1. Sentence Types for Experiment 1.

True Informative Some (TIS)	Some shoes have heels that are very high.
True Underinf. Some (TUS)	Some people have noses with two nostrils.
True All (TA)	All snow is cold and can melt into water.
False All (FA)	All women are doctors who went to medical school.

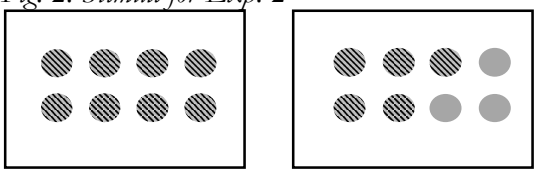
Fig. 1. Ratings for Exp. 1



Participants did not vary in their ratings of False All, True All, or Informative Some sentences across speaker conditions. However, they rated the critical Under-Informative Some statements significantly higher in the Non-Native condition as compared to the Native speech condition, (p<.001, Fig. 1). Thus, comprehenders have different expectations about use of nuanced pragmatic means of conveying information based on the group that the speaker belongs to (native vs. non-native, in this case). Two possibilities are left open: SIs might be derived less frequently from the speech of non-native speakers; alternatively, (presumably accidental) under-informativeness might be tolerated more in non-native compared to native speech. Exp. 2 tests these possibilities.

Exp. 2. English monolinguals (N=38) listened to 80 sentences spoken by a female Native English speaker, and 80 sentences spoken by a female (Mandarin Chinese-accented) Non-Native English speaker (blocked, counterbalanced). After each sentence, participants viewed an array of objects for 500 ms, and were then asked to respond to whether the sentence matched the array (press 'Good'/'Bad' key). Conditions mapped on to those tested in Exp. 1. (Fig. 2). If non-native speech biases listeners toward a semantic interpretation, participants should be slower to compute SIs (i.e., respond 'Bad') for Non-Native speech as compared to Native speech. Reaction times did not differ between the Native and Non-Native speaker conditions (all p's>.1, Fig. 3). This potentially suggests that the results of Exp. 1 do not reflect lack of implicature calculation from foreign-accented speech but simply a more tolerant attitude to infelicities in non-native speech in a slower, reflective task.

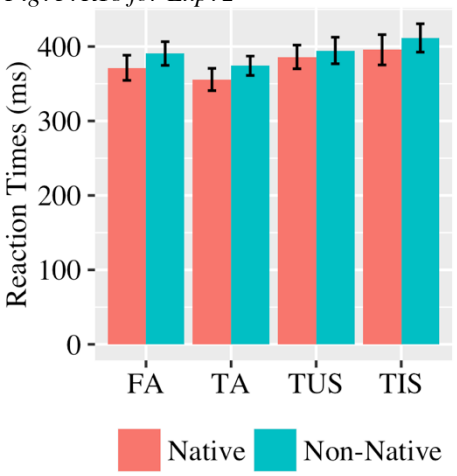
Fig. 2. Stimuli for Exp. 2



TUS: Some of the circles are striped. **TA**: All of the circles are striped.

TIS: Some of the circles are striped. **FA**: All of the circles are striped.

Fig. 3. RTs for Exp. 2



The results of the two experiments presented here show that listeners have different expectations about the pragmatic intentions of speakers, based on speaker group membership. However, these expectations may not be available at the earliest moments of processing. Instead, listeners may re-evaluate their interpretation after the fact to be more tolerant to under-informativeness from non-native speakers. Results are discussed in relation to their implications for formal pragmatic theories[6, 7] and psycholinguistic models of language processing.[8, 9, 10]

References: 1. Kuperberg & Jaeger (2015). 2. Grice (1975). 3. Bergen & Grodner (2012). 4. Yildirim et al. (2015). 5. Hanulikova et al. (2012). 6. Levinson (2000). 7. Sperber & Wilson (1986). 8. Pickering & Garrod (2013) 9. Egorova et al. (2013) 10. Degen & Tanenhaus (2014).