

## What can a conventional implicature tell us about pragmatic processing

Paul Grice made a distinction between *conversational* and *conventional implicatures*. Unlike conversational implicature, which is a pragmatic contribution derived inferentially from the linguistically encoded meaning of a sentence, a conventional implicature is a pragmatic contribution that is carried by a linguistic element within a sentence. A standard example of a conventional implicature comes from the connective *but*, which is essentially a conjunction that is logically equivalent to *and*; its added pragmatic value consists of making a contrast between conjuncts. This can be seen by substituting *and* in *Sheila is rich and unhappy* with *but*.

The current work experimentally investigates a conventional implicature because (a) these have been largely understudied (for discussion, see Potts et al. 2007), and especially compared to conversational implicature in the experimental literature and; (b) it is important to consider the extent to which the robust experimental findings linked to conversational implicatures are generalizable. To wit, developmental investigations of scalar implicatures (archetypical conversational implicatures in which, e.g., *Some X are Y* are understood by listeners to mean *Not all X are Y*) reveal that adults are more likely than children to make such pragmatic enrichments, indicating that pragmatic maturity accrues with age (for a recent summary, see Papafragou & Skordos, 2016). In the same vein, experimental studies show that scalar utterances are not routinely enriched by adults and that, when they are, they come with a slight cost (for recent work, see Huang & Snedeker, 2018), indicating that pragmatic inference-making is an effortful process.

Our main question is the following: Are the well-known developmental and processing effects linked to pragmatic enrichment (e.g. scalar implicature) generalizable to cases of conventional implicature? If they are, it would indicate that pragmatic processes are similar across categories and regardless of their origin. This determination is important theoretically because for some scholars, viz. Bach (1999), the added value inherent in a conventional implicature is propositional and not due to inferential pragmatic procedures. In contrast, evidence indicating that hallmark pragmatic effects are not extended to conventional implicatures would set limits on what is known about pragmatic inference while potentially providing support for claims like Bach's.

We focus on what are known as contrapositives (Choi, 1991), which are response options (found in a subset of languages) indicating that the implicit affirmative of a negative question is true. For example, a French speaker who responds *Si* to *Vous ne mangez pas de viande?* [*You don't eat meat?*] indicates that a) the questioner's underlying affirmative (*You eat meat*) is indeed the case, and that; b) the linguistically-encoded reading of the question is false. Similar to *but* with respect to *and*, *Si* is a pragmatically rich version of *Oui*. Note that the absence of a contrapositive in English makes *Yes* appear ambiguous (it is unclear what the answerer is affirming).

*Pre-registered predictions.* In light of previous hallmark findings with respect to pragmatic processing, we expected 1) to find less competence in employing *Si* as we investigate progressively younger participants, and we expected; 2) adults to reveal that their employment of *Si* to be more effort-demanding relative to control responses.

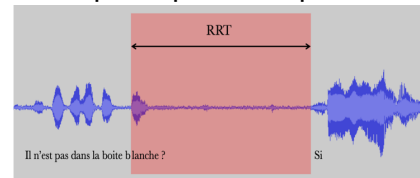
We developed a novel paradigm (consisting of 40 trials) that prompts participants to naturally answer *Oui*, *Non*, and *Si*. The game behind each trial is to find a candy hidden in one of two boxes (e.g. one red and one white), both of which can be seen as covered on a screen (see an exemplary trial below, which is best viewed magnified). The puppet ultimately makes two statements. The first concerns a belief state (first panel). The puppet asserts either (a) an Affirmative belief (e.g. *It is surely in the white box*), (b) a Negative belief (e.g. *It is surely not in the white box*), or; (c) a Neutral belief (*I don't know where it is*). (Due to length limitations, we do not describe the purpose of this step here [but see Schmerse et al., 2013 for a precedent]). At this point, a box is made to appear to slide off the screen (through experimenter intervention) and on to the table (panels 2-3). The participant then inspects the emerged box and places it back down re-covered (panels 4-5). The on-screen puppet then asks (sixth panel) an affirmative or negative question, e.g. *Il est/n'est pas dans la boîte blanche?* [*It is (not) in the white box?*]. In the trial below, the puppet

opens with an affirmative belief, the participant finds a candy in the emerged box, and the puppet follows with a negative question before the participant provides a *Si* response (see the last panel):



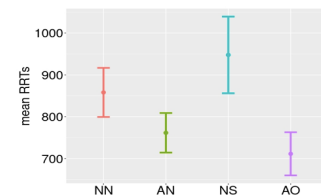
If the question (in the sixth panel) were affirmative, the appropriate answer would be *Oui* and if the presented box were empty instead of full (in fourth panel), the appropriate answer would be *Non* (regardless of the question's polarity). This makes for four experimental conditions providing 24 of the trials: Affirmative-Oui (AO), Affirmative-Non (AN), Negative-*Si* (NS), Negative-Non (NN).

The participant's spontaneous oral responses were recorded and transcribed. Aside from rates of appropriate responses, our main dependent variable was the participant's response latency, referred to as the *Response Reaction Time*, or *RRT*. As illustrated on the right, this is determined by measuring latency (via Audacity software) between the earliest moment there is enough information to answer, i.e. at the start of mentioning the disambiguating box color (e.g., "bl..." in "boîte blanche"), and the moment the participant voices a response.

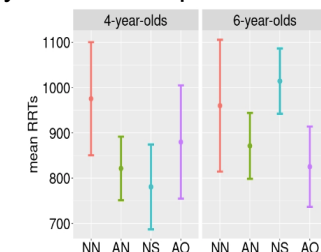


Reported effects are those that provide strong evidence (indicating very high probabilities that they go beyond the null) based on Bayesian models of the outcomes.

Experiment 1 included 24 Adults and 24 6-year-olds. The two age groups' rates of accurate responding were comparable as were their *patterns* of RRT across conditions. The only developmental difference was that the 6-year-olds were consistently slower than the adults. We thus combined the latency data across ages and confirmed that the NS condition was the slowest of the four (see Figure on right). This is a novel finding. There are classic studies that are similar, e.g. Clark & Chase (1972); these show that NN-type responses are slowest but they do not offer a *Si*-like option.



In an effort to uncover developmental effects, Experiment 2 investigated (21) 4-year-olds who were compared to the 6-year-olds. While rates of accuracy were comparable across the two ages, the RRT results were remarkable. As can be seen on the right, the 4-year-olds' responses were comparable to the 6-year-olds' across the three control conditions (AO, AN, and NN). However, the 4-year-olds' NS responses were *fastest* (in fact, of all three age groups). This indicates that the youngest know that the *Si* response is the appropriate option in the context of a negatively polarized question; nevertheless, they do not fully appreciate its pragmatic potential. In our view, the youngest children are not addressing the questioner's implicit affirmative proposition.



**Conclusions.** This study used natural responses and their latencies to show that linguistic elements themselves are associated with hallmark pragmatic effects. Adults and (adult-like) 6-year-olds reveal that effortful pragmatic inference-making arises when *Si* is called for. Interestingly, the 4-year-olds use *Si* but do not appear to incorporate a pragmatic procedure.

**References.** **Bach (1999)** The myth of conventional implicature. *Ling and Philo*, 327-366. **Choi, S. (1991)** Children's answers to yes-no questions. *Dev Psy*, 27(3), 407-420. **Clark & Chase (1972)** On...comparing sentences against pictures. *Cog Psych*, 3(3), 472-517. **Huang & Snedeker (2018)** Some inferences still take time...*Cog psych*, 102, 105-126. **Papafragou & Skordos (2016)** *Scalar Implicature*. Oxford Handbook of Developmental Linguistics, 611-629. **Potts, C. (2007)** Into the conventional-implicature dimension. *Philo Compass*, 2(4), 665-679. **Schmerse, Lieven & Tomasello (2013)** Discourse particles and belief reasoning: The case of German *doch*. *J of Semantics*, 31(1), 115-133.