Experimentally investigating the strengthening properties of disjunction in French: When exclusivity meets free choice and ad hoc implicatures

French has at least two forms of disjunction, the simple 'ou' (1), and the complex 'soit…soit' (2).

(1) Anne a acheté la glace **ou** la tarte.
(2) Anne a acheté **soit** la glace **soit** la tarte. 'Anne bought the ice cream or the pie.'

'Soit…soit' is argued to trigger obligatory exhaustivity effects [1], which in unembedded contexts amounts to an obligatorily *exclusive* reading of the disjunction, namely that not both disjuncts are true. In this study, we investigate the obligatory exhaustivity requirement of 'soit…soit' by looking at the interaction of exclusivity with two other kinds of inferences: free choice [2] and ad hoc implicatures [3]. Exp.1 shows as a baseline that 'soit…soit' is indeed more *exclusive* compared to 'ou' in unembedded contexts. Exps. 2-3 show that when we introduce the possibility of strengthening to free choice or ad hoc implicatures, this difference between 'soit…soit' and 'ou' disappears. The findings support the proposal that 'soit…soit' is associated with obligatory exhaustification, which can be satisfied via exclusivity, free choice (FC), or ad hoc implicatures.

Experiments: All three experiments used the same paradigm. Participants were given a context story about characters shopping at a store. On each trial, a puppet named Rafie would make guesses about what the character would buy (Exp.1/3), or would describe what the character was allowed to buy (Exp.2). Participants had to judge whether the puppet was right or wrong, against the pictured outcome/rules. In each experiment, disjunction type ('ou' vs. 'soit…soit') was a between-subject variable. Participants saw 2 training items, followed by 30 test items (the relevant targets, true and false controls, and true and false fillers, all presented in randomized order).

Exp.1 (Baseline): *Participants*: 60 French native speakers were recruited through Prolific (30 'ou', 30 'soit…soit'). *Procedure:* On each trial, Rafie made a guess about what the character would buy (e.g., *Anne will buy the ice cream or the pie*). On the next screen, participants saw a picture of two items; purchased items were circled in green, while unpurchased items had a red circle and line through them (Fig.1). Participants had to judge whether Rafie's guess matched the pictured outcome. *Materials:* Critical targets (x10) involved both items circled in green, falsifying exclusivity. True controls satisfied exclusivity, while on false controls neither pictured item was purchased. *Results:* Accuracy was >97% on fillers/controls. Fig.2 displays the mean proportion of yes-responses to Excl-False and Excl-True trials. We fit a mixed effect logistic regression model with target type (Excl-False vs. Excl-True), disjunction type ('ou' vs. 'soit…soit'), and their interaction as fixed effects, and random by-participant slopes for target type. Model comparisons revealed effects of target type ($\chi2(1)=15$, $p<.001$) and disjunction type ($\chi2(1)=7.4$, $p<.01$), and a marginal interaction ($\chi2(1)=3.4$, $p=.065$). Importantly, people treated 'ou' differently from 'soit…soit', with more rejections of 'soit…soit' when exclusivity was not satisfied.

Figure 1. Image from Exp.1

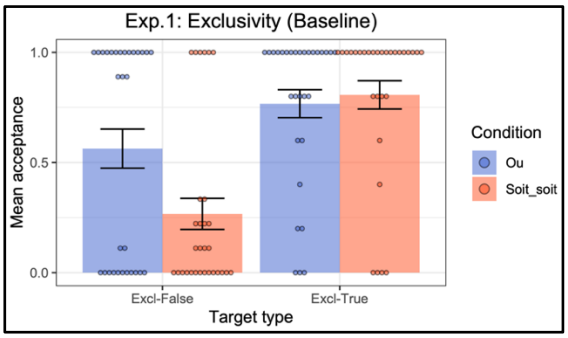

Figure 2. Results from Exp.1

Exp.2 (Adding FC): *Participants*: Another 61 French native speakers were recruited through Prolific (31 'ou', 30 'soit…soit'). *Procedure:* This time, what Rafie had to describe were the rules that Mum had set out for what each character was allowed to buy (e.g., *Anne is allowed to buy the ice cream or the pie*, which generates the FC inference that Anne is allowed to buy the ice cream and Anne is allowed to buy the pie). On each trial, there were three pictures side by side: the first object, the second object, and the third possibility was the combination of the two objects.

As explained in the instructions to participants, a green circle around an individual item meant that the character was allowed to purchase that item; a red circle with a line through an item meant that the character was not allowed to buy it; a green circle around the combination of the two items meant that the character could buy both; a red circle with a line through the third possibility indicated the character could not buy both items at the same time (Fig.3). Participants had to judge whether the puppet correctly described the rules. *Materials:* FC-True/Excl-False targets (x5) satisfied FC but falsified exclusivity, and FC-False/Excl-True targets (x5) falsified FC but satisfied exclusivity. *Results:* One participant was excluded for failing controls/fillers. For the remaining 60, mean accuracy was >95% on controls/fillers. Fig.4 displays the mean proportion of yes-responses to the FC-True/Excl-False and FC-False/Excl-True targets. We fit a mixed effect logistic regression model with target type (FC-True/Excl-False vs. FC-False/Excl-True), disjunction type ('ou' vs. 'soit…soit'), and their interaction as fixed effects, and random by-participant slopes for target type. Model comparisons revealed an effect of target type ($\chi2(1)=59$, $p<.001$), no effect of disjunction type ($\chi2(1)=.20$, $p=.66$), and no interaction ($\chi2(1)=.05$, $p=.82$). Importantly, people did not treat 'ou' and 'soit…soit' differently, responding primarily based on the truth/falsity of the FC inference. When the context falsified FC, participants always rejected the targets, suggesting the FC inference is quite strong, if not obligatory; meanwhile the bimodal distribution of participants in the FC-True/Excl-False condition shows that only some participants computed exclusivity *in addition to the FC inference* – even for 'soit...soit'.

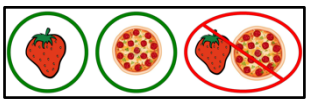

Figure 3. Image from Exp.2.

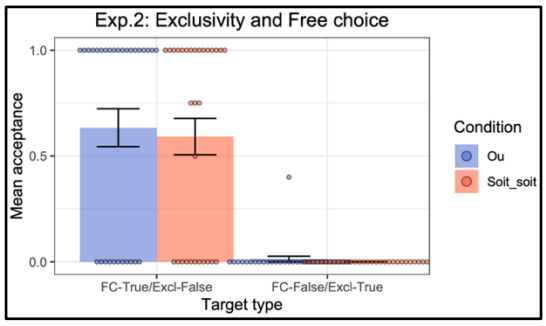

Figure 4. Results from Exp.2.

Exp.3 (Adding ad hoc implicatures): *Participants*: Another 60 French native speakers were recruited through Prolific (30 'ou', 30 'soit…soit'). *Procedure:* The set-up was as in Exp.1, but each picture contained three objects instead of two (allowing for ad hoc implicatures arising from the use of disjunction). *Materials:* Adhoc-True/Excl-False targets verified the ad hoc implicature but falsified exclusivity, while Adhoc-False/Excl-True targets falsified the ad hoc inference but satisfied exclusivity. *Results:* Fig.5 displays the proportion of yes-responses to the targets. Mixed effect logistic regression models revealed no effect of target type, disjunction type, or interaction. Unlike the FC data in Exp.2, the data in Exp.3 suggest that neither ad hoc nor exclusivity inferences are obligatory, with more than half of participants accepting when one of the inferences was false. Importantly, people did not treat 'ou' and 'soit…soit' differently.

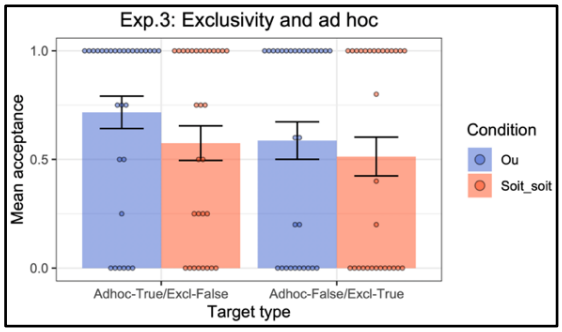

Figure 5. Results from Exp.3.

Discussion: Exp.1 confirms that when making judgments based on exclusivity alone, participants treat 'soit…soit' as more exclusive than 'ou'. However, once another inference is at play, be it FC (Exp.2) or ad hoc implicatures (Exp.3), the difference in the strength of exclusivity of the two disjunctions disappears. These findings are consistent with the idea that it is not exclusivity that is obligatory for 'soit…soit', but rather *strengthening* of some kind [1]. When strengthening via another implicature is an option, the difference between 'ou' and 'soit…soit' disappears, with participants becoming considerably less exclusive with 'soit…soit'.

References: [1] Spector, B. (2014). Global positive polarity items and obligatory exhaustivity. *Semantics & Pragmatics 7.* [2] Fox, D. 2007. Free choice and the theory of scalar implicatures. *Presupposition and Implicature in Compositional Semantics*, 71–120. [3] Hirschberg, J.L. (1991). *A theory of scalar implicature*.