

## On the acquisition of simple and complex disjunctions in French and Japanese

**Summary:** This paper presents a set of experiments designed to test children’s comprehension of simple and complex disjunctions in French and Japanese. First, consistent with previous literature, we found that both groups of children computed fewer ‘not-both’ exclusivity inferences (EIs) than adults. Second, we found clear evidence for conjunctive interpretations of disjunction across both kinds of disjunction, in both language groups. Finally, we found little evidence that children distinguish the two types of disjunctions in comprehension. We provide an explanation of our findings, tying them to recent discussions about the acquisition of disjunction and scalar implicatures (SIs).

**Background:** Children have been reported to compute fewer SIs than adults. For disjunction, Gualmini et al. (2001) and Chierchia et al. (2001) report that children lack EIs, accepting ‘A or B’ in ‘A and B’ scenarios. More recently, Singh et al. (2013) report that English-speaking children reject ‘A or B’ in ‘only A’ and ‘only B’ scenarios. They discuss two possible explanations: (i) children may associate *or* with the lexical item *and*; (ii) children may recursively exhaustify ‘A or B’ relative to the set of domain alternatives {‘A’, ‘B’}, and derive the implicatures ‘not only A’ and ‘not only B’, rendering ‘A or B’ and ‘A and B’ equivalent. Singh et al. (2013) present data in favor of (ii), but these results, restricted to English, have not been independently corroborated.

**Current study:** We extend the investigation of children’s interpretation of disjunction to include both simple and complex forms of disjunction, in two further, typologically unrelated languages. While both the simple French *ou*/Japanese *ka* and complex French *soit...soit*/Japanese *ka...ka* give rise to EIs, the EI for complex disjunction has been argued to be obligatory (Spector 2014) (1). We set out to test for EIs across these two types of disjunction, and to establish whether the reported conjunctive interpretation reflects a developmental phenomenon generalizable beyond English.

(1) Example of simple disjunction / Example of complex disjunction

*Fr.* La poule a poussé le bus ou l’avion. / La poule a poussé soit le bus soit l’avion.

*Jp.* Niwatori-san-wa Bus-ka hikooki-o osita. / Niwatori-san-wa Bus-ka hikooki-ka-o osita.  
‘The chicken pushed the bus or the airplane.’ / ‘The chicken pushed either the bus or the airplane.’

**Experiment:** We designed a study to compare the rates of inclusive, exclusive, and conjunctive interpretations of *ou/soit...soit* and *ka/ka...ka*. 17 French adults, 10 Japanese adults, 21 French children (3;11-5;05, M=4;07), and 19 Japanese children (4;07-6;06, M=5;04) participated in the experiment. The task involved a guessing game with a puppet, designed to make the use of disjunction felicitous. Short stories were presented on a laptop computer. On typical test trials, participants would hear stories about animal characters with two objects each; the animals would be expected to carry out an action with one, both, or none of the objects. Before they did, the experimenter would ask a puppet to guess what would happen, and the puppet would utter a disjunctive test sentence. In the final scene, the participant would see the outcome of the story: on a 1-disjunct-true (1DT) trial, for example, the chicken would push only the bus (Fig. 1); on a 2-disjunct-true (2DT) trial, the chicken would push both the bus and the airplane. Participants were asked to decide if the puppet had guessed correctly. Participants saw two training items, four 1DT test trials, four 2DT test trials, two false controls (0 disjuncts true), and three filler trials with dynamic targets, presented in pseudorandomized and counterbalanced order.

**Results:** Fig. 2 displays the rate of acceptance in control and test conditions. Fig. 3 plots the data by individual, and reveals groupings based on responses to 1DT and 2DT conditions. Participants who gave more than 50% *yes*-responses to both 1DT and 2DT targets were categorized as *inclusive*; those who gave more than 50% *yes*-responses to 1DT and fewer than 50% *yes*-responses to 2DT

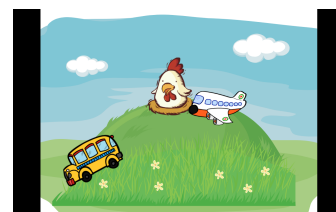


Figure 1: Final outcome of a 1DT trial (*The chicken pushed the bus or the airplane.*)

targets as *exclusive*; and those who gave fewer than 50% *yes*-responses to 1DT targets and more than 50% *yes*-responses to 2DT targets as *conjunctive*. All others were categorized as inconsistent responders. Adults were *exclusive* across both disjunction types. There were fewer *exclusive* children than adults (Poisson model,  $z=4.3$ ,  $p<.001$ ). A Poisson model on the child data with grouping, disjunction type, language, and their interaction as predictors, revealed no significant difference between the number of *inclusive* and *conjunctive* children ( $z=1.4$ ,  $p=.17$ ), significantly fewer *exclusive* than *inclusive* or *conjunctive* children ( $z=-2.6$ ,  $p=.009$ ), and no effect of language, disjunction type, or interaction (all  $|z|<1$ ,  $p>.4$ ).

**Discussion:** Besides providing further evidence that children compute fewer EIs from disjunction than adults across different languages, our findings also shed light on how children engage with scalar inferences more generally. In particular, our results are consistent with recent proposals that place children’s difficulty with SIs in the accessibility of the required alternatives (e.g., Barner et al. 2011). On the alternatives-based approach, children fail to compute EIs from both types of disjunction because they do not access conjunction as an alternative to the disjunction. Crucially however, the individual disjuncts that are required to compute a ‘conjunctive’ meaning for the disjunction (as proposed in Singh et al. 2013) are explicitly presented to the children – as substrings of the test sentences themselves. Thus we observed robust evidence for conjunctive readings across both forms of disjunction, in both language groups. The widespread nature of the conjunctive reading, across distinct forms of disjunction, and across typologically unrelated languages, is suggestive of a more general developmental phenomenon, rather than a language-specific source of lexical confusion. Finally, our findings connect to previous studies revealing, on the one hand, children’s successful performance on free choice inferences (Tieu et al., in press), and, on the other hand, adult-like interpretations of disjunction under negation (e.g., Gualmini & Crain 2002; Goro & Akiba 2004). Our proposal reconciles all of the above: children are adult-like in their semantics for disjunction and in their ability to compute SIs (when the alternatives are made available), but they lack conjunction as an alternative to disjunction.

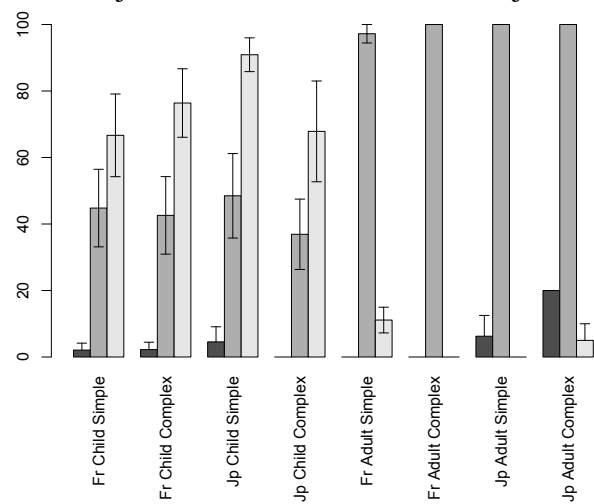


Figure 2: Percentage of *yes*-responses by number of true disjuncts.

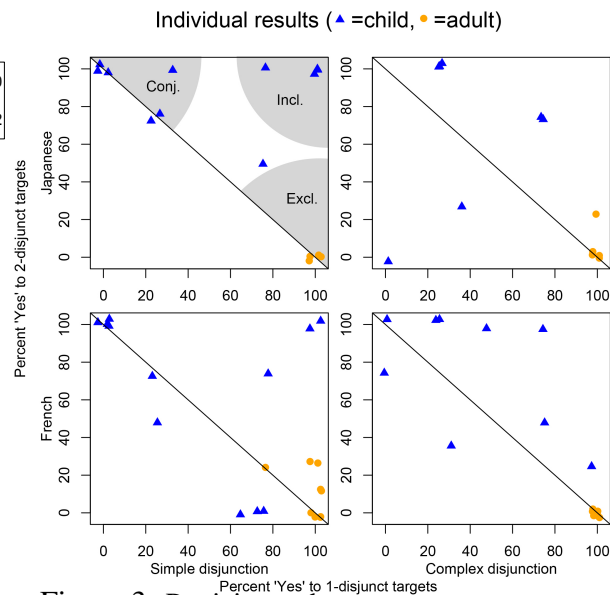


Figure 3: Participants by response pattern.

**Selected References:** Barner, D., N. Brooks & A. Bale. 2011. Accessing the unsaid: the role of scalar alternatives in child’s pragmatic inferences. *Cognition*. Chierchia, G., S. Crain, M. Guasti & R. Thornton. 2001. ‘Some’ and ‘or’: A study on the emergence of logical form. *BUCLD*. Singh, R., K. Wexler, A. Astle, D. Kamawar & D. Fox. 2013. Children interpret disjunction as conjunction: consequences for the theory of scalar implicatures. Tieu, L., J. Romoli, P. Zhou, & S. Crain. In press. Children’s knowledge of free choice inferences. *Journal of Semantics*.