Journal of Semantics, 00, 2025, 1–42
https://doi.org/10.1093/jos/ffaf011
Advance Access Publication Date: 13 August 20xx
Article

Children interpret some disjunctions conjunctively: Evidence from child Romanian

Adina Camelia Bleotu[1,2,*], Lyn Tieu[3,4,5], Anton Benz[6], Alexandre Cremers[7], Gabriela Bîlbîie[1], Mara Panaitescu[1], Rudmila Rodica Ivan[8], Andreea Cristina Nicolae[6]

[1]Faculty of Foreign Languages and Literatures, University of Bucharest, Pitar Moş Street 7-13, 010451, Bucharest, Romania
[2]Department of Linguistics, Faculty of Philological and Cultural Studies, University of Vienna, Sensengasse 3a, 1090, Vienna, Austria
[3]Department of French, University of Toronto, 81 St. Mary Street, M5S 1J4, Toronto, ON, Canada
[4]MARCS Institute for Brain, Behaviour and Development, Western Sydney University, Locked Bag 1797, NSW 2751, Australia
[5]Department of Linguistics, Macquarie University, 16 University Ave, NSW 2109, Australia
[6]Leibniz-Zentrum Allgemeine Sprachwissenschaft (ZAS), Pariser Straße 1, 10719, Berlin, Germany
[7]BKKI, Vilniaus Universitetas, Universiteto g. 5, LT-01131, Vilnius, Lithuania
[8]Acuity Insights, 325 Front Street West, M5V 2Y1, Toronto, ON, Canada

*Corresponding author: adina.bleotu@lls.unibuc.ro

Abstract

Studies show that adults interpret simple forms of disjunction (*The mouse carried an apple or an orange*) inclusively (*The mouse carried one, possibly both*) or exclusively (*The mouse carried one but not both*), while they generally interpret complex disjunction (e.g. *either . . . or*) exclusively (Tieu *et al.* 2017; Nicolae *et al.* 2025). Children, however, who tend to interpret simple forms of disjunction inclusively or conjunctively (*The mouse carried both*) (Paris 1973; Braine and Rumain 1981; Singh *et al.* 2016; Huang and Crain 2020; Skordos *et al.* 2020), reportedly interpret complex disjunctions in the same way (Tieu *et al.* 2017; see also Sauerland and Yatsushiro 2018). While previous studies have focused on one simple and one complex disjunction (e.g., Tieu *et al.* 2017; Sauerland and Yatsushiro 2018), the present study investigates multiple simple disjunctions (neutral and prosodically marked *sau*) and complex disjunctions (*sau . . . sau*, *fie . . . fie*) in child Romanian. We ask whether children's conjunctive interpretation of disjunction is an experimental artifact that arises in contexts where the disjunctive statement mentions all visible objects in the display (and is thus potentially underinformative). If so, then this interpretation should disappear in contexts where the disjunctive statement is made more informative. We also ask what role prosodic and morphological markedness play in the interpretation of disjunction. We conducted two Truth Value Judgment Tasks in prediction mode in order to address these questions. In Experiment 1, the visual displays contained two objects, and the disjunctive test sentences mentioned both. While adults were exclusive, children were mostly inclusive with *sau*-based disjunctions, but they were conjunctive and inclusive with *fie . . . fie*. In Experiment 2, the visual displays contained two additional unmentioned objects. Children were primarily inclusive with *sau*-based disjunctions, showing no sensitivity to prosodic/morphological markedness, but there was also evidence for conjunctive interpretations from children who oscillated between interpretations. Importantly, while children were less conjunctive with *fie . . . fie* in Experiment 2 compared to Experiment 1, a considerable number of conjunctive

Received 7 December 2023; **revised** 1 August 2025; **accepted** 2 August 2025

responses were still observed. Our findings support the view that the conjunctive interpretation, albeit not the dominant one, is nonetheless a genuine semantic/pragmatic interpretation in development.

Keywords: disjunction; first language acquisition; Romanian; conjunction; ambiguity; implicature; experimental pragmatics

1 Introduction

A disjunctive utterance such as (1) has been shown to allow for a multitude of interpretations in adult and child language (Paris 1973; Braine and Rumain 1981; Chierchia *et al.* 2001; Gualmini *et al.* 2001; Nicolae and Sauerland 2016; Singh *et al.* 2016; Tieu *et al.* 2017; Sauerland and Yatsushiro 2018; Huang and Crain 2020; Skordos *et al.* 2020; Nicolae *et al.* 2025): an inclusive, an exclusive, and a conjunctive interpretation (see Fig. 1).

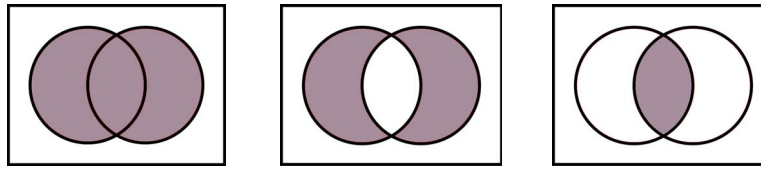
(1) The mouse carried an apple **or** an orange.
   a. *Inclusive*: The mouse carried an apple or an orange, possibly both.
   b. *Exclusive*: The mouse carried an apple or an orange, but not both.
   c. *Conjunctive*: The mouse carried an apple and an orange.

Experimental results have shown that adults tend to interpret disjunctions either inclusively or exclusively (Chierchia *et al.* 2001; Gualmini *et al.* 2001; Nicolae and Sauerland 2016; Nicolae *et al.* 2024, 2025), with the distribution of interpretations being dependent on the type of disjunction: while simplex disjunctions (as in (1)) may be interpreted either inclusively or exclusively, depending on the contextual compatibility between the two disjuncts (Jasbi *et al.* 2018, 2022; Bleotu *et al.* 2025e; Felton and Jasbi 2025), there is a preference to associate morphologically complex disjunctions (such as *either . . . or* in (2)) with an exclusive interpretation (Spector 2014; Szabolcsi 2015).

(2) The mouse carried **either** an apple **or** an orange.

Developmental studies, on the other hand, show that alongside inclusive and exclusive interpretations, children aged 3 to 8 are also likely to derive conjunctive interpretations for disjunction (Paris 1973; Braine and Rumain 1981; Singh *et al.* 2016; Tieu *et al.* 2017; Sauerland and Yatsushiro 2018; Huang and Crain 2020; Skordos *et al.* 2020). There seems to be some variation depending on the language investigated: for instance, English-, French-, and Japanese-speaking children have been found to be inclusive or conjunctive (Singh *et al.* 2016; Tieu *et al.* 2017), while German-speaking children have been found to be inclusive or exclusive (Sauerland and Yatsushiro 2018). The contrast between different disjunctive markers has generally received very little attention in the literature (see Nicolae and Sauerland 2016; Nicolae *et al.* 2024, 2025 for adult data, and Tieu *et al.* 2017 and Sauerland and Yatsushiro 2018 for child data).The present investigation aims to provide insights into whether the interpretation of disjunction varies with disjunction type, similarly to what is observed in adult language, and if so, how the different possible interpretations are distributed among the different disjunctive markers.

The focus of this paper will be an experimental investigation of how Romanian-speaking children differ in their interpretation of different disjunction markers, with special attention to the question of whether they have a genuine conjunctive interpretation. In Section 2, we provide background on previous work regarding children's interpretation of disjunction. In Section 3, we outline the research questions, motivation, and predictions underlying our study. We present our experiments in Section 4 and discuss their results in detail in Section 5. Finally, in Section 6, we draw conclusions, arguing that, at least for some disjunctions, the conjunctive reading represents a genuine semantic-pragmatic interpretation.



(a) Inclusive (b) Exclusive (c) Conjunctive

Figure 1. Representations of disjunctive meanings using Venn diagrams.

2 Children's conjunctive interpretation of disjunction

While children's inclusive interpretations have been typically explained as corresponding to a logical interpretation of disjunction (in line with Noveck 2001), the source of their conjunctive interpretations has been a subject of debate in the developmental literature.

2.1 Alternatives-based account

According to Singh *et al.* (2016) and further supported by Tieu *et al.* (2017), the conjunctive interpretation of disjunction corresponds to a strengthened meaning of disjunction. Their proposal is couched within the *Alternatives-based account* of children's difficulties with scalar implicatures, as developed in Barner and Bachrach (2010) and Barner *et al.* (2011). Under this account, in contrast to adults, children have difficulty accessing scalar alternatives of a lexical nature, often requiring explicit access to alternatives or contextual support to derive implicatures. Singh *et al.* (2016) build on this idea of restricted access to alternatives to explain why children sometimes interpret disjunction as conjunction.

According to Singh *et al.* (2016) and Tieu *et al.* (2017) and following much of the previous literature on the meaning of disjunction and its associated inferences (Sauerland 2004), the alternatives to a disjunctive utterance for adults include each individual disjunct, as well as the stronger conjunctive alternative *A and B* (3-a). In contrast, it is proposed that children access only the individual disjuncts, as in (3-b):[1]

(3) Possible alternatives to 'A or B'
   a. Adults: $\{A, B, A \wedge B\}$
   b. Children: $\{A, B\}$

Turning now to the details of the strengthening mechanism, the authors argue that the conjunctive interpretation for disjunction comes about similarly to how free choice inferences are derived. Assuming a framework wherein strengthening is obtained via application of an exhaustification operator EXH, which negates all innocently excludable alternatives and is contradiction-free, the exclusive interpretation comes about as in (4-b) (Fox 2007).[2] Note that of the alternatives in (4-a), only the conjunction can be negated without giving

[1] Support for the idea that children lack access to stronger scalar alternatives can be found in studies that show that children generally compute fewer implicatures than adults from the existential quantifier *some* and weak modal verbs like *might* (see Noveck 2001; Papafragou and Tantalou 2004; Guasti *et al.* 2005; Pouscoulous *et al.* 2007, among others, and for Romanian see, for instance, Stoicescu *et al.* 2015; Bleotu 2021; Bleotu *et al.* 2021).

[2] For presentational purposes, we will frame our discussion within the same framework as these authors, namely one where free choice inferences come about via recursive exhaustification, in the spirit of Fox (2007). There exist other approaches such as Chemla (2008)'s similarity proposal and Franke (2011)'s game-theoretic proposal, which derive conjunctive implicatures for disjunctive sentences when such alternatives are considered, as well as Bar-Lev and Fox's (2020) proposal that takes strengthened meanings to arise via a process of innocent inclusion. Since the particulars of the implementation are orthogonal to our topic of investigation, we will set this discussion aside here.

rise to a contradiction. While the individual disjuncts are also stronger alternatives, negating both of them would contradict the disjunctive assertion, while negating only one of them would lead to the inclusion of the other one, an arbitrary move that is ruled out within such a system (see Katzir 2007; Fox and Katzir 2011; Katzir 2014; Breheny *et al.* 2018 for discussion of the symmetry problem).

(4) Exclusive interpretation of 'A or B'
   a. $\text{Alt}(A \vee B) = \{A, B, A \wedge B\}$
   b. $\text{EXH}[A \vee B] = (A \vee B) \wedge \neg(A \wedge B)$

Assuming the alternatives in (4) thus allows us to generate the exclusive interpretation of a sentence like (5).

(5) The mouse carried an apple or an orange.
   a. The mouse carried an apple and an orange.
   b. NOT (The mouse carried an apple and an orange),
      i.e. *The mouse did not carry both an apple and an orange.*

In the absence of the conjunctive alternative, the result of strengthening is vacuous if the alternatives are the individual disjuncts as in (6), since, for the reasons mentioned above, neither can be negated without giving rise to a contradiction.

(6) Unstrengthened interpretation of 'A or B'
   a. $\text{Alt}(A \vee B) = \{A, B\}$
   b. $\text{EXH}[A \vee B] = (A \vee B)$

At this point, the strengthening mechanism can be applied recursively, which amounts to allowing us to consider different alternatives, namely those obtained by applying the EXH operator to each individual alternative, as in (7-a). Observe that these alternatives are, as before, stronger than the assertion, and furthermore, that their negation can be consistently added to the assertion; that is, no contradiction arises. The resulting strengthened meaning in (7-b) is the conjunctive interpretation.

(7) Conjunctive interpretation of 'A or B'
   a. $\text{Alt}(\text{EXH}[A \vee B]) = \{\text{EXH } A, \text{EXH } B\}$
      $= \{A \wedge \neg B, B \wedge \neg A\}$
   b. $\text{EXH}[\text{EXH}[A \vee B]] = (A \vee B) \wedge \neg(A \wedge \neg B) \wedge \neg(B \wedge \neg A)$
      $= A \wedge B$

More concretely, we can see this in (8), where the negation of the strengthened alternatives (8-a) and (8-b), as in (8-c), gives rise to the conjunctive interpretation in (8-d), once conjoined with the assertion.

(8) The mouse carried an apple or an orange.
   a. EXH(The mouse carried an apple)
      i.e. *The mouse only carried an apple.*
   b. EXH(The mouse carried an orange)
      i.e. *The mouse only carried an orange.*
   c. NOT(EXH(The mouse carried an apple)) and NOT(EXH(The mouse carried an orange))
      i.e. *The mouse didn't only carry an apple, and the mouse didn't only carry an orange.*

d. EXH(EXH(The mouse carried an apple or an orange))
i.e. *The mouse carried an apple or an orange, and he didn't only carry an apple, and he didn't only carry an orange.*
i.e. *The mouse carried both an apple and an orange.*

Importantly, the recursive exhaustification mechanism exemplified above is able to account not only for children's conjunctive interpretation of disjunction, but also for adults' and children's free choice interpretation of modalized disjunctive sentences such as *You may carry an apple or an orange* (Kratzer and Shimoyama 2002; Alonso Ovalle 2006; Fox 2007; Chemla 2008; van Rooij, 2010; Franke 2011; Chierchia 2013; Zhou *et al.* 2013; Tieu *et al.* 2016), or even for adult Warlpiri speakers' interpretation of disjunction (Bowler 2014).

It is important to understand the conditions under which children strengthen. The account, as presented thus far, predicts that if strengthening is optional, children should assign either a logical *or* interpretation or a strengthened *and* interpretation.

Singh *et al.* (2016) argue that conjunctive strengthening is driven by the need to provide a complete answer to a question under discussion (such as *What did the mouse carry?*). Since the disjunctive utterances in Singh *et al.* (2016) are descriptions of events that happened, the disjunctive interpretation does not represent a complete answer, whereas the conjunctive one does, if we assume the speaker is knowledgeable about two actions happening. This argument, however, does not easily carry over to Tieu *et al.* (2017), who did not employ a descriptive truth value judgment task but rather a predictive task, where a puppet made guesses about what would happen. Such a task rendered the use of disjunction felicitous since its use could convey ignorance with respect to the individual disjuncts, something that could be achieved in a guessing task but not in a description task. It is therefore less clear why children should resort to exhaustification in such a task, but one potential reason could be that in a guessing game, one is expected to make clear predictions/bets rather than statements that leave room for uncertainty. Consequently, both statements that lack a disjunctive operator and those with a conjunctive operator would count as more appropriate guesses than disjunctive statements.

As mentioned above, the task design has the potential to influence our interpretation of the results. In Section 2.3, when we discuss the *Artifact account*, we will see that the task design also has the potential to influence children's responses.

2.2 Ambiguity account

The *Ambiguity account*, as proposed by Sauerland and Yatsushiro (2018), aims to provide another possible interpretation of the child data, grounded in the supposition that children may not always know the meaning of a connective. Their proposal is that when that is the case, the connective is ambiguous between two interpretations: a disjunctive and a conjunctive one.[3] Crucially, the conjunctive interpretation is not derived from the disjunctive one under this account. Instead, children are argued to resolve the ambiguity by recourse to the Strongest Meaning Principle (SMP), as formulated in (9), choosing the strongest meaning wherever possible.

(9) SMP: If S is ambiguous between interpretations α and β, and α entails β, then the weaker interpretation β is inaccessible. (Dalrymple *et al.* 1998, among others)

These two components—ambiguity between disjunction and conjunction, supplemented with the SMP—make clear predictions about whether a disjunctive utterance will be

[3] Their justification for the two interpretations being these ones is based on what meanings languages generally lexicalize, namely *or* and *and* rather than other logical binary operations such as 'nand', 'nor', or 'xor'.

associated with a disjunctive meaning or a conjunctive meaning, depending on the monotonicity properties of its context: the conjunctive interpretation should emerge in an upward monotonic environment, and the disjunctive interpretation should surface in a downward entailing environment. Another crucial component to their proposal builds on work by Spector (2014), who argues that certain natural language disjunctive markers are obligatorily associated with EXH, meaning that they can only be used if they give rise to a strengthened meaning. Whereas on an *and* interpretation EXH would be vacuous as there are no stronger alternatives, on an *or* interpretation EXH would not be vacuous and would lead to stronger interpretations. Two questions arise at this point: which disjunctions are more likely to be associated with EXH and what is the effect of applying EXH? To answer the first question, the authors follow Spector (2014) in assuming that complex disjunctions are obligatorily associated with EXH. As for the second question, while Sauerland and Yatsushiro (2018) are not explicit about this, it appears that they diverge from the *Alternatives-based account* and assume that children, like adults, invoke the conjunctive alternative when deriving the strengthened interpretation. Putting all these assumptions together, they predict that:

- Complex disjunctions, by virtue of being obligatorily associated with EXH, should never be associated with conjunctive interpretations (since that would render EXH vacuous) but rather with exclusive interpretations, which can be derived by applying EXH.
- Simple disjunctions should alternate between disjunctive and conjunctive interpretations, depending on the context.[4]

The general prediction is thus that children should assign more conjunctive readings for simple disjunction than for complex disjunction. This view, however, is not supported by either their own findings for German children or the findings in Tieu *et al.* (2017), where children treated both simple and complex disjunctions alike, being equally inclusive and conjunctive with both. Sauerland and Yatsushiro (2018) point out that, if coupled with the *Alternatives-based account*, the obligatory EXH assumption in Spector (2014) predicts that children should be more conjunctive when tested with a complex disjunction than with a simplex one—a prediction that fails to be borne out in both their experiment and that of Tieu *et al.* (2017), given that no differences were observed between simple and complex disjunctions for children.

2.3 Artifact account

While the *Alternatives-based account* and the *Ambiguity account* treat the conjunctive interpretation of disjunction as a genuine interpretation that can be derived by speakers, according to more recent proposals by Huang and Crain (2020) and Skordos *et al.* (2020), the conjunctive interpretation is an experimental artifact or a repair strategy that children resort to under certain circumstances. Below we outline two such proposals, starting with Huang and Crain's (2020) *Informativeness Account* and continuing with Skordos *et al.*'s (2020) *Plausible Dissent Account*.

As Huang and Crain (2020: 78) observe, in experiments where disjunctions were interpreted conjunctively, the experimental contexts did not involve additional objects apart from those mentioned in the disjuncts. The disjunctions, when understood logically, were thus not informative. Huang and Crain note that in the presence of additional objects, however, a disjunction becomes informative, since its use can give rise to the exhaustive inference that nothing besides the mentioned disjuncts holds true. Hence, children are expected to no longer give conjunctive responses. For example, consider the sentence in (10). If uttered in a context in which there are exactly two pink balloons and two yellow

[4] They do not discuss this, but their proposal predicts that since EXH is optional, it could apply before the SMP, in which case we should also expect exclusive interpretations in upward entailing contexts.

balloons, nothing informative can be concluded. On the other hand, if uttered in a context that additionally includes two green balloons, the sentence will be informative as it will eliminate the possibility of the penguin choosing a green balloon.

(10) The penguin will choose a pink balloon or a yellow balloon.

This hypothesis regarding the effect of additional objects was indeed confirmed by their findings: while a proportion of the Mandarin-speaking children tested in Huang and Crain (2020) were conjunctive when the disjunction could apply to all of the objects in the display (i.e. there were only pink and yellow balloons), children were no longer conjunctive when additional objects were introduced in the display (i.e. when there were pink, yellow, and green balloons). They instead accepted sentences such as (10) as true both in contexts where the situation held of only one disjunct and in those where it held of both disjuncts. In other words, children showed an inclusive profile in their interpretation patterns for disjunctive sentences.

According to Huang and Crain (2020), children provided non-adult-like responses in 2-object contexts because, for them, the disjunctive sentences did not add information unless they were assigned a conjunctive interpretation. Note, however, that if assigned an adult-like exclusive interpretation, the use of disjunction would be informative, even in a context with only two objects. The explanation regarding the lack of informativeness is therefore understood to exclude the possibility of exclusive readings.

This finding regarding the effect of additional objects on children's interpretation of disjunction has also been confirmed by Experiment 3 in Skordos *et al.* (2020)'s study, which showed that modifying the Tieu *et al.* (2017) stimuli to include an additional object in the display significantly decreased the number of conjunctive children. It is worth noting, however, that their experiment also included an additional modification whereby various explanations that might have biased the child towards a certain interpretation were removed from the script.[5]

Another artifact-related explanation is couched in terms of *plausible dissent* and is put forward by Skordos *et al.* (2020). They too argue that the conjunctive interpretation arises because the experimental design involves only two objects. However, their argument is somewhat different; they claim that when only two objects are present in the display, it is unclear to children when they should say *no* when they evaluate a statement making reference to these objects. According to Crain and Thornton (1998), any Truth Value Judgment Task needs to satisfy the condition of plausible dissent, making it so that children can easily imagine a context in which an utterance might prove to be false. According to Skordos *et al.* (2020), such a plausible dissent condition is missing from disjunction experiments involving only two objects in the display, because these objects are all mentioned in the disjunctive utterance. That is, there is nothing in the visual display that could potentially falsify the disjunctive statement (for example, an object C that the character could plausibly act upon instead of objects A or B).[6] Adding another alternative provides children with a context where the disjunctive utterance can conceivably be falsified, satisfying plausible dissent, a crucial condition for the Truth Value Judgment Task (Crain and Thornton 1998).

It is worth noting that, unlike Huang and Crain (2020), Skordos *et al.* (2020) do not fully endorse an explanation of the results in terms of informativeness, given that, in the

[5] For example, for the target sentence *The chicken pushed a plane or a boat*, presented in a context where only the boat was pushed, the authors removed from the script: *The chicken didn't want to break that one (i.e. the airplane), so she didn't touch it*.

[6] While the experiment in Tieu *et al.* (2017) did have control trials involving three objects, in which the character acted upon a different object than the ones mentioned in the disjunctive statement uttered by the puppet, Skordos *et al.* (2020) argue that it is important that, even in the test items, children should be able to imagine a situation where the character acts upon a different object than the ones mentioned in the disjunctive utterances.

additional objects condition, all parses of the disjunctive utterance (inclusive, conjunctive, exclusive) would be informative to a certain degree, so children's preference for the inclusive over the other two interpretations cannot be explained solely on these grounds. Moreover, their argument appears to assume that, contrary to the findings in Gotzner *et al.* (2020), children do not spontaneously compute ad-hoc implicatures (at least in the experimental contexts that were tested). If children computed ad-hoc implicatures, inferring that the third, unmentioned object was not acted upon, then the conjunctive parse of the disjunctive utterance would provide a more informative answer (*A and B but not C* would in principle be more informative than *A or B but not C*).

While the proposals in Huang and Crain (2020) and Skordos *et al.* (2020) differ in their details, the core idea remains the same: the conjunctive interpretation of disjunction is merely an artifact of the experimental task, not a genuine semantic or pragmatic interpretation; moreover, this reading disappears with experimental manipulations involving the inclusion of additional objects in the display. We believe that these findings do not necessarily show that the conjunctive pattern is an experimental artifact, but instead suggest that when there are additional objects in the display, the conjunctive parse is less likely, since children can also derive exhaustive or ad hoc inferences. That is, the conjunctive interpretation may well be a genuine semantic-pragmatic reading, but one that is less preferred than the interpretation with an ad hoc implicature.

It is also worth noting that, while the accounts above have been presented as if they are in competition, they may not necessarily be mutually exclusive. The space of possible readings for a disjunctive sentence, or any sentence, includes various interpretations, the choice among which can be driven by linguistic as well as contextual factors. These interpretations can range from inclusive to conjunctive readings, depending on the cognitive strategies and linguistic competence of the child or adult. Participants, whether children or adults, use strategies such as ambiguity resolution, implicature computation, and contextual inferencing to arrive at a final interpretation. The Artifact account, rather than competing with other accounts like the Alternatives-based or Ambiguity accounts, may actually complement them by explaining children's strategy in a specific kind of context.

In the current study, we extend the investigation of the source of the conjunctive interpretation of disjunction by looking at multiple forms of disjunction in child Romanian, to determine whether the inclusion of additional objects in the context influences the various forms of disjunctions to a similar extent.

3 Research questions and predictions

3.1 Research questions

We have two main research questions. Our first research question (Q1) is: do children's conjunctive interpretations of disjunction correspond to genuine semantic-pragmatic interpretations (Singh *et al.* 2016; Tieu *et al.* 2017; Sauerland and Yatsushiro 2020), or are they a mere experimental artifact, as argued by Huang and Crain (2020) and Skordos *et al.* (2020)? To answer this question, similarly to Huang and Crain (2020) and Skordos *et al.* (2020) we conducted two experiments: Experiment 1 (2 objects), where we replicated Tieu *et al.*'s (2017) study of disjunction in child Romanian, and Experiment 2 (4 objects), where we modified the previous experiment by presenting children with additional objects beyond those mentioned in the disjunctive utterances. While Skordos *et al.* (2020) added one extra object to the display, we added two extra objects, to make it even more obvious that there were other objects not mentioned by the puppet (though we did not really anticipate any important differences between adding one versus two objects).

As an example, the disjunctive utterance in (11), containing the disjunction *fie . . . fie*, mentions two objects that the mouse could carry (an apple, an orange). In Experiment 1

(a) Experiment 1

(b) Experiment 2

Figure 2. Examples of pictures employed in Experiment 1 (2 objects) and Experiment 2 (4 objects).

(2 objects), participants saw an apple and an orange, whereas in Experiment 2 (4 objects), participants saw an apple and an orange, as well as a plum and a cucumber (see Fig. 2).

(11) Şoricelul a cărat **fie** un măr **fie** o portocală.
mouse.DEF has carried either an apple or an orange
'The mouse carried either an apple or an orange.'

Our second research question (Q2) is: do children interpret marked and unmarked disjunctions alike? The motivation for this question comes from Horn's Markedness Principle (Horn 1984), shown below in (12), and the observation from adult language that morphological complexity plays a role in the interpretation of disjunction cross-linguistically (Nicolae and Sauerland 2016; Nicolae *et al.* 2025).

(12) **Horn's Principle of Division of Pragmatic Labor**
Marked forms should have marked meanings.

In terms of morphological form, we assume that simple forms are unmarked and reduplicated forms are marked. In line with Horn (1972), Katzir and Singh (2013), Buccola *et al.* (2021), among others, in terms of semantic meaning, we assume that the logical, inclusive meaning of disjunction is the unmarked, default meaning, while the exclusive meaning of disjunction is the marked pragmatic meaning. Assuming the exclusive meaning is derived from the inclusive one via an implicature, it may require additional effort from participants in communication. For instance, in Buccola *et al.* (2021), inclusive 'or' is argued to be more primitive than exclusive 'xor'. The view that logic is the default starting point, and pragmatic computation involves a subsequent step is also in line with Noveck (2001), who showed that children are more logical than adults, and is further reinforced by processing work in Bott and Noveck (2004). Furthermore, the existence of multiple logical connectives with varying complexity and interpretive differences supports a model of semantic universals and variation in which languages optimize the trade-off between (a) lexical simplicity/complexity and (b) lexical informativeness (see Uegaki 2024).

Note that the question of whether children associate complex (marked) disjunctions with a different meaning than simple (unmarked) disjunctions has previously been asked for children as well, with the following contrasts under investigation:

- *ka* vs. *ka* . . . *ka* (Japanese, see Tieu *et al.* 2017)
- *ou* vs. *soit* . . . *soit* (French, see Tieu *et al.* 2017)
- *oder* vs. *entweder* . . . *oder* (German, see Sauerland and Yatsushiro 2018)

Note that each of these contrasts was of a different type, in one case involving plain reduplication of the simple disjunctive particle (*ka . . . ka*), in another an iterated particle that does not overlap with the simple disjunction (*soit . . . soit*), and in another case a non-iterated form of disjunction in which only one of the particles overlaps with the simple disjunction (*entweder . . . oder*).

Additionally, another contrast that has attracted attention is the prosodic contrast between *or* in assertions versus *or* in questions in English (Jasbi *et al.* 2018, 2022): *or* in questions, when associated with a rise-fall intonation such as *Wanna stay or go?*, appears to give rise to an exclusive interpretation to a higher extent than *or* in assertions associated with a flat intonation such as *I'll get tea or coffee*.

While previous studies focused on comparing two disjunctions at a time, the present study looked at multiple differences simultaneously in Romanian, investigating morphological markedness through different disjunctions within the same language, and furthermore bringing into the picture another type of markedness, prosodic markedness. Prosodic markedness has previously been discussed in relation to the distinction between assertions and questions (Jasbi *et al.* 2018, 2022) and in the context of the contrast between marked and neutral disjunction (Bleotu *et al.* 2024), but more research is needed to shed light on the role of prosodic markedness in assertions in contexts that do not involve an explicit contrast between disjunctions.

3.2 Why Romanian? Motivating our investigation and choice of items

Romanian represents a rich testing ground for children's interpretation of disjunction, given that there is an abundance of commonly used disjunctions (simplex disjunctions such as *sau*, *ori*, as well as complex disjunctions such as *sau . . . sau*, *ori . . . ori*, *fie . . . fie*). Moreover, there has been little experimental research investigating implicatures with disjunctions in Romanian even for adults (some exceptions include Lungu *et al.* 2021 and Nicolae *et al.* 2024, 2025). While multiple studies have investigated Romanian children's ability to derive scalar implicatures with existential quantifiers or epistemic adverbs (Stoicescu *et al.* 2015; Bleotu 2019; Bleotu *et al.* 2021, 2022, 2025a) implicatures arising from the use of disjunction have only recently come under scrutiny (Bleotu *et al.* 2023, 2025d).

In the current study, we consider our two research questions in relation to multiple simple and complex forms of disjunction in order to assess the role played by different types of markedness: prosodic markedness and morphological markedness.

First, to establish whether prosodic markedness plays a role in interpretation, we decided to explore the contrast between neutral *sau* and marked *sau*, two prosodic variants of the most frequent simplex disjunction in Romanian:[7]

- *sau* with a neutral prosody, i.e. no prosodic boundary after the first disjunct;
- *sau* with a marked prosody, where both disjuncts are stressed.

Specifically, we wanted to determine whether there is a prosody-interpretation mapping for the two prosodically distinct *sau*-disjunctions. Data from Jasbi *et al.* (2018, 2022) suggest that prosody is a strong indicator of an exclusive interpretation; one might then expect it to play a role in children's developing understanding of disjunction. While previous studies from other languages suggest that adults can associate different intonations with different meanings (Armstrong 2014, 2020; Gotzner *et al.* 2013, 2016; Meertens *et al.* 2019), as far

[7] Romanian has another simplex disjunction, *ori*. We opted to test *sau* rather than *ori* on grounds of high frequency in usage. As presented in Bleotu *et al.* (2023), we conducted a corpus study on Romanian Web 2016 (roTenTen16), the largest existing Romanian corpus that can be accessed online, consisting of 3,142,636,172 tokens (https://www.sketchengine.eu/rotenten-romanian-corpus/\#\#toggle-id-1). We found that *sau* is more frequent than *ori*. Consequently, we reasoned that it would be better to test children on a disjunction they are more likely to have heard than on one they are less likely to have heard.

as children are concerned, the literature is divided: on the one hand, there are studies that suggest that children are not sensitive to prosody (Crain *et al.* 1994; Choi and Mazuka 2003; Sekerina and Trueswell 2012; Armstrong 2014, 2020), and others that suggest that they are (Snedeker and Yuan 2008; Ito *et al.* 2012; Zhou *et al.* 2013; Szendrői *et al.* 2018; Yatsushiro *et al.* 2019).

In a recent study, Bleotu *et al.* (2024) investigated this question in Romanian-speaking adults and 5-year-olds using a forced choice task in which two puppets made predictions containing either neutral or marked *sau*. Adults preferred neutral *sau* when both disjuncts were true and marked *sau* when only one was, showing sensitivity to prosodic markedness. Children, on the other hand, did not differentiate between prosodically marked and neutral *sau*. In the present study, we further investigate participants' sensitivity to prosodic markedness through a truth value judgment task.

Besides prosodic markedness, we also set out to explore the role of morphological markedness, by testing two morphologically complex disjunctions. We examined *sau . . . sau*, which consists of the reduplication of the simple disjunction *sau*, similarly to Japanese *ka . . . ka*; this was relevant for establishing whether reduplication plays a role in interpretation.[8] We also examined *fie . . . fie*, which lacks a simple counterpart, similarly to French *soit . . . soit*. The contrast between *sau . . . sau* and *fie . . . fie* was relevant for establishing whether features other than reduplication may have interpretive effects, given the absence of a simple counterpart *fie*. Importantly, as pointed out in Bleotu *et al.* (2023), it is also worth noting that *fie . . . fie* is less frequent than *sau . . . sau*, which might contribute to its being less familiar to children.

3.3 Predictions

We begin with research question Q1 and consider the predictions of the *Artifact account* regarding the conjunctive interpretation of disjunction. If the *Artifact account* is correct, then we should observe at least some conjunctive interpretations for children in Experiment 1, because the disjunction mentions both objects that appear in the visual display. In contrast, we should observe no conjunctive interpretations in Experiment 2, because there the disjunctive utterance mentions only a subset of the objects in the display. In contrast, adults should show no sensitivity to this design manipulation if they tend to derive exclusivity implicatures with disjunction by default.[9]

Let us turn now to the second research question (Q2) about *the role of markedness* in the interpretation of disjunction. Given Horn's Markedness Principle, as well as previous experimental work on this particular question, we expect to observe an interpretive difference in adult Romanian between unmarked and morphologically marked disjunctions (recent work by Nicolae *et al.* 2025 shows that complex disjunctions are cross-linguistically more likely to be exclusive than simple disjunctions). As for prosodically marked disjunctions, here too we predict that Romanian adults will differentiate between the two prosodically distinct *sau*-disjunctions: specifically, marked *sau* should be associated with more exclusive interpretations than neutral *sau*. This prediction finds support in previous studies, which show that adults are sensitive to different prosodic patterns for implicatures

[8] While we could have tested *ori... ori*, which also has a simplex counterpart, *ori*, we chose to test *sau . . . sau* on grounds of frequency: in our corpus study, the sequence *sau . . . sau* was found to be more frequent than the sequence *ori... ori*. Note that these sequences are also found in cases involving three or more disjuncts, as in (i). Crucially, these do not fall under the category of complex disjunctions that we are interested in, since the first disjunct is not preceded by the disjunctive particle. Since both *sau* and *ori* participate in such constructions, we infer from the frequency numbers that their frequency in the complex construction is relative to their overall frequency.

(i) Laura a vorbit cu Ana {sau/ori} cu Maria {sau/ori} cu Amalia.
Laura AUX.3SG talk.PTCP with Ana or with Maria or with Amalia
'Laura has talked with Ana or with Maria or with Amalia.'

[9] Note, however, that the informativeness account predicts that adults should be more exclusive in Experiment 1 compared to Experiment 2.

and epistemic markers (Armstrong 2014, 2020; Gotzner *et al.* 2013, 2016; Meertens *et al.* 2019)

Turning now to the predictions for child Romanian with respect to morphological markedness, the previous results in Tieu *et al.* (2017) would lead us to predict that children will not show a difference between *sau* on the one hand, and *sau . . . sau* and *fie . . . fie* on the other. However, we will also test a competing hypothesis, relying on the distinct make-up of the complex disjunctions we are investigating. Specifically, since *sau . . . sau* is built off *sau* but *fie . . . fie* does not have a simple counterpart, we hypothesize that children can generalize the interpretation of *sau* to *sau . . . sau*, but that *fie . . . fie* will be interpreted differently from *sau*. If children have a one-to-one mapping of meaning to form, as argued by Slobin (1973), then it is plausible that they might assign the same meaning to both *sau* and *sau . . . sau*, given that the complex disjunction simply involves a reduplication of the simple form. In contrast, given the fact that *sau* has a different form from *fie . . . fie*, children should interpret *fie . . . fie* differently.

Regarding prosody, previous studies lead us to have mixed expectations. As previously mentioned, Jasbi *et al.'s* (2018, 2022) suggestion that prosody plays a role in the understanding of disjunction leads us to expect that children might show sensitivity to prosody in our experiments. More generally, some studies indicate that children are not sensitive to prosody (Crain *et al.* 1994; Choi and Mazuka 2003; Sekerina and Trueswell 2012; Bleotu *et al.* 2024), while other research suggests that children do show sensitivity to the mapping between prosody and interpretation (Snedeker and Yuan 2008; Ito *et al.* 2012; Armstrong 2014, 2020; Yatsushiro *et al.* 2019; Jasbi *et al.* 2018, 2022). Given these conflicting results, our expectations regarding prosodic markedness remain open.

4 Experiments

4.1 Aims

In Experiment 1 (2 objects), we replicated Tieu *et al.* (2017) in child and adult Romanian, in order to establish how participants interpret the various forms of disjunction in Romanian, in contexts where the disjunctive utterances mentioned the only two objects in the context. Previewing our results, we found that children were primarily inclusive with *sau*-based disjunctions, but predominantly conjunctive with *fie . . . fie*.

In Experiment 2 (4 objects),[10] we investigated whether Romanian-speaking children's conjunctive interpretations of disjunction correspond to a genuine semantic-pragmatic interpretation (e.g. an implicature or a conjunctive default) or an experimental artifact, by looking at whether conjunctive interpretations persist when there are additional objects in the display beyond those mentioned in the disjunctive utterance, i.e. when the display contains four objects instead of just two. While the conjunctive interpretation is a genuine reading according to the *Alternatives-based account* and the *Ambiguity account*, according to the *Artifact account* it is a repair strategy not grounded in the grammar. If children persist in their conjunctive interpretation of disjunction, then we can infer that this interpretation is not merely an experimental artifact. Previewing our results, we found that, while there was a decrease in conjunctive responses in the 4-objects task compared to the 2-objects task, the number of conjunctive responses remained non-negligible for the disjunction *fie . . . fie*.

4.2 Participants

In Experiment 1, 55 Romanian-speaking children aged 4 to 6 years (M=5;4) were recruited from kindergartens in Bucharest: 12 were tested on neutral *sau*, 13 on marked *sau*, 15 on *sau . . . sau*, and 15 on *fie . . . fie*. Moreover, 115 adult native speakers of Romanian were recruited as controls. These adult participants were undergraduate students at the University

[10] This experiment corresponds to the baseline experiment reported in Bleotu *et al.* (2025b).

of Bucharest and received course credit for completing the experiment. In all, 27 adults were tested on neutral *sau*, 27 on marked *sau*, 31 on *sau . . . sau*, and 30 on *fie . . . fie*.

In Experiment 2, we tested 51 Romanian-speaking children aged 4 to 6 years (M=5;4): 11 were tested on neutral *sau*, 12 on marked *sau*, 14 on *sau . . . sau*, and 14 on *fie . . . fie*. Additionally, 100 native Romanian-speaking adults were recruited as controls: 29 were tested on neutral *sau*, 21 on marked *sau*, 27 on *sau . . . sau*, and 23 on *fie . . . fie*. As part of another study, we subsequently tested an additional 43 children on Experiment 2 for three of the four disjunctions (marked *sau*, *sau . . . sau*, *fie . . . fie*): 14 participants on marked *sau*, 15 on *sau . . . sau*, and 14 on *fie . . . fie*. We have included the additional children as participants in the present study in order to address reviewers' concerns that the initial sample size was too small. These additional data can be accessed in the *Newdata_6august_JCL* Excel file, available at the OSF entry: https://osf.io/y3h4t/?view_only=6047cee72d884d37bdabc1e39714441f. Given that we were missing additional data on neutral *sau* for the present study, we also tested 19 children on this disjunction. For Experiment 2, then, the sample includes a total of 113 Romanian-speaking children aged 4 to 6 years (M=5;4): 30 were tested on neutral *sau*, 26 on marked *sau*, 29 on *sau . . . sau*, and 28 on *fie . . . fie*.

4.3 Methodology

In both Experiment 1 (2 objects) and Experiment 2 (4 objects), we employed the methodology in Tieu *et al.* (2017) and subsequent work, namely a Truth Value Judgment Task presented in Prediction Mode rather than Description Mode. Such a task licenses ignorance inferences, which often characterize disjunctive statements. Participants had to evaluate whether a puppet called Bibi made correct guesses about the outcome of a situation. If they believed Bibi was right, they were supposed to give him a smiley face. If they believed he was wrong, they were supposed to give him a sad face. Both experiments employed the same methodology, but two more objects were added to the display in Experiment 2 compared to Experiment 1 (see Fig. 3 vs. Fig. 4).

The experiments were preceded by a warm-up, containing simple non-disjunctive statements, where participants became familiarized with the experimental paradigm (see Appendix A), and they were guided in giving Bibi a smiley or a sad face.

The puppet's guesses for the test and control items took the form of disjunctive sentences. We employed a between-subjects design in order to test the following disjunctions: neutral *sau*, marked *sau*, *sau . . . sau*, and *fie . . . fie*. We thus tested four different groups of children. This design ensured that each group of participants only heard statements containing one type of disjunction. This was done in order to prevent participants' interpretation of one disjunction from being influenced by hearing other disjunctions. While the existence of multiple disjunctions may nonetheless create competition between these forms, we did not wish to activate contrasts that a child would not instinctively think of on their own. Each participant thus saw disjunctive statements containing only one type of disjunction, such as those in (13):

(13) a. Şoricelul a cărat un măr **sau$_{\text{neutral}}$** o portocală.
mouse.DEF has carried an apple or an orange
'The mouse carried an apple or an orange.'

b. Şoricelul a cărat un măr **sau$_{\text{marked}}$** o portocală.
mouse.DEF has carried an apple or an orange
'The mouse carried an apple or an orange.'

c. Şoricelul a cărat **sau** un măr **sau** o portocală.
mouse.DEF has carried or an apple or an orange
'The mouse carried either an apple or an orange.'

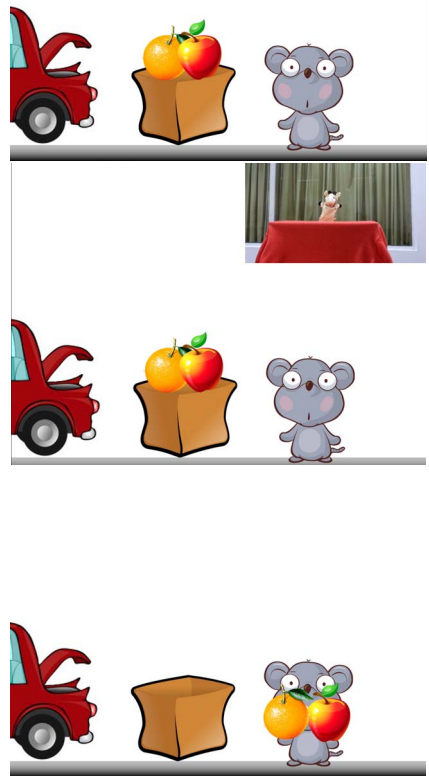


Figure 3. Experiment 1: The three scenes of an experimental trial in which the sentence *The mouse carried an orange or an apple* was uttered in a 2DT context.

d. Şoricelul a cărat **fie** un măr **fie** o portocală.
mouse.DEF has carried or an apple or an orange
'The mouse carried either an apple or an orange.'

Each trial consisted of three scenes, as shown in Fig. 3 for Experiment 1 and in Fig. 4 for Experiment 2. Below we describe how the experimental trials proceeded, scene by scene:

- **Scene 1** *Experimenter:* Once upon a time there was a little mouse who liked to help his mother with her shopping. One day, his mom bought some fruit: an orange and an apple (*Experiment 1*) / an orange, an apple, a plum, and a cucumber (*Experiment 2*). Of course, the little mouse wanted to help his mommy with the shopping. Let's see if Bibi can guess what happened next!
- **Scene 2** *Experimenter:* Bibi, tell us what happened next. *Bibi:* The mouse carried an apple or an orange. *Experimenter:* Let's see if Bibi's right!
- **Scene 3** *Experimenter:* Look, the mouse carried this and this! So was Bibi right?

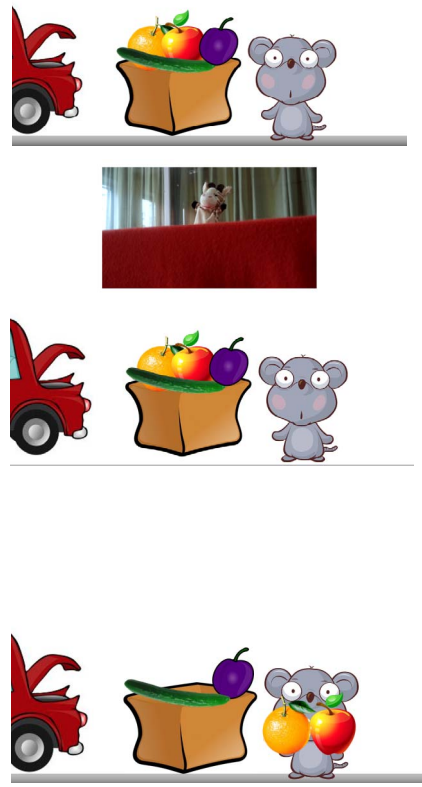


Figure 4. Experiment 2: The three scenes of an experimental trial in which the sentence *The mouse carried an orange or an apple* was uttered in a 2DT context.

4.4 Materials

The same materials were used in both Experiment 1 (2 objects) and Experiment 2 (4 objects), with the only difference being the inclusion of two additional objects in the pictured contexts in Experiment 2. Participants started with two practice trials, where the puppet made one good guess and one bad guess. This was meant to familiarize participants with the experimental procedure. The training trials were then followed by a pseudorandomized sequence of 10 experimental items, and 3 non-disjunctive fillers (2 true, 1 false).

The experimental items involved 8 target items presented in two critical conditions (a 1-disjunct-true condition, where only one of the disjuncts was made true, and a 2-disjunct-true condition, where both disjuncts were true), and 2 controls presented in a 0-disjunct-true condition, where neither disjunct was made true:

- 1-disjunct-true (1DT) (4 trials): *The mouse carried an apple.*
- 2-disjunct-true (2DT) (4 trials): *The mouse carried both an apple and an orange.*
- 0-disjunct-true (0DT) (2 trials): *The mouse carried neither an apple nor an orange.*

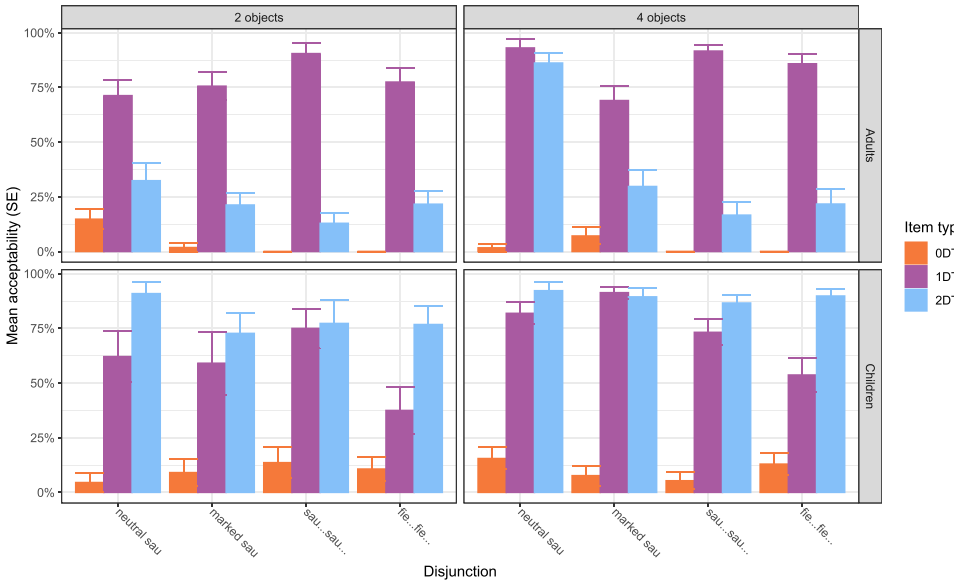


Figure 5. Proportion of Accept responses for control and target items in each condition.

4.5 Analyses and results

Data from the two experiments were analyzed together in order to test for task effects. The data and analysis can be accessed at https://osf.io/ewc6v/?view_only=a97edb54b7124b2a99912e421843b321. We first filtered out participants with an error rate greater than 50% on unambiguous trials. Concretely, there were three fillers and two 0DT controls per participant, so we only kept participants who correctly answered at least three of these five trials. This resulted in the exclusion of two adults and eight children in Experiment 1 and three children in Experiment 2.

Figure 5 displays the acceptability of each condition. We can already see that children and adults behaved very differently: in all conditions but neutral *sau* with 4 objects, adults predominantly accepted the 1DT scenario and rejected the 2DT scenario, suggesting an exclusive interpretation. Children, on the other hand, systematically accepted the 2DT condition more than the 1DT condition. The higher rate of acceptance for 2DT over 1DT suggests a higher rate of conjunctive interpretations than of exclusive interpretations. The rate of acceptance of disjunctive utterances in 2DT was above 75% for all disjunctions in both tasks. The rate of acceptance for *fie . . . fie* in 1DT was lower than 50% in the 2-objects task and slightly higher than 50% in the 4-objects task, but for all the other disjunctions, it was higher than 50% and generally lower than the corresponding one for 2DT. Additionally, the rate of acceptance for 1DT tended to be lower for *fie . . . fie* than for the *sau*-based disjunctions in both tasks. This suggests more conjunctive behaviour with *fie . . . fie* than with the *sau*-based disjunctions.

4.5.1 Analysis of raw responses

We analyzed participants' responses to the 1DT and 2DT conditions using Bayesian mixed-effects logistic regressions fitted with the R package `brms` (Bürkner 2017).

The dependent variable was the binary response and the predictors were Condition, Task, Disjunction, and all their interactions. Data from children and adults were analyzed separately.

Table 1. Logistic regression results with children: summary of the posterior effect of Condition (1DT v. 2DT) for each task and disjunction.

Task	Disjunction	Mean	SD	95% CI
2 objects	neutral sau	1.24	0.93	[−0.55, 3.09]
	marked sau	−0.44	1.00	[−2.41, 1.53]
	sau . . . sau	1.10	0.81	[−0.47, 2.73]
	fie . . . fie	3.02	0.82	[1.49, 4.72]
4 objects	neutral sau	2.76	1.32	[0.29, 5.47]
	marked sau	0.66	1.18	[−1.68, 2.94]
	sau . . . sau	0.19	1.21	[−2.19, 2.52]
	fie . . . fie	2.83	1.04	[0.89, 4.91]

Task and Disjunction were sum-coded while Condition was treatment-coded with 1DT as a baseline. We used the maximal by-participant random-effects structure, which in this case included only random intercepts, slopes for Condition, and their correlation, as all other predictors were between-subjects (Barr *et al.* 2013).

Table 1 presents the posterior estimates for the effect of condition in children for each task and disjunction. In short, children tended to accept the 2DT condition more than the 1DT condition. While the effect is clear in both tasks for *fie . . . fie*, it is only clear in the 4-objects task with neutral *sau*. With adults, we observed the opposite pattern. The 2DT condition was generally less acceptable than the 1DT condition across all disjunctions and tasks, except for neutral *sau* in the 2-objects task, where the 95% CI overlapped with 0.

Because raw responses are not the most informative way to look at the data, however, we omit a detailed discussion of the raw data here, and in the next section instead analyze individual participants' interpretations.

4.5.2 Categorizing participants

As mentioned, raw responses are not the most informative way to look at the data. Since at least three interpretations are conceivable (inclusive, exclusive, conjunctive), a single condition cannot fully identify an interpretation, and averages are likely hiding mixtures of participants with different interpretations. It is therefore crucial to look at individual participants' interpretations and how their distribution varies between conditions. Figure 6 shows the detailed distribution of participants in each group and condition based on their responses to 1DT and 2DT items.

For statistical analyses, previous studies (Tieu *et al.* 2017; Huang and Crain 2020; Skordos *et al.* 2020) categorized each participant based on their responses to 1DT and 2DT targets: a participant who accepted both would be inclusive, a participant who accepted 1DT but rejected 2DT would be exclusive, and a participant who accepted 2DT but rejected 1DT would be conjunctive. Because participants see multiple 1DT and 2DT items, the categorization is based on a participant's most frequent response to each type of item, and participants who accepted exactly 50% of trials for either condition must be treated separately, as they do not fit a single category. The problem with this categorization is that some information is lost: it does not distinguish between a 75% or a 100% acceptance rate to a given condition, and more importantly, it forces us to exclude all 'mixed' participants who accepted one or both conditions at a 50% rate. On top of this, running parametric tests on count data for each category can require large sample sizes to guarantee that each relevant category has enough participants (it is usually recommended to have at least five elements per category to run a χ^2-test).[11]

[11] In an earlier draft, we relied on similar parametric tests. We thank anonymous reviewers and the editor for highlighting their limitations and encouraging us to improve our analyses.

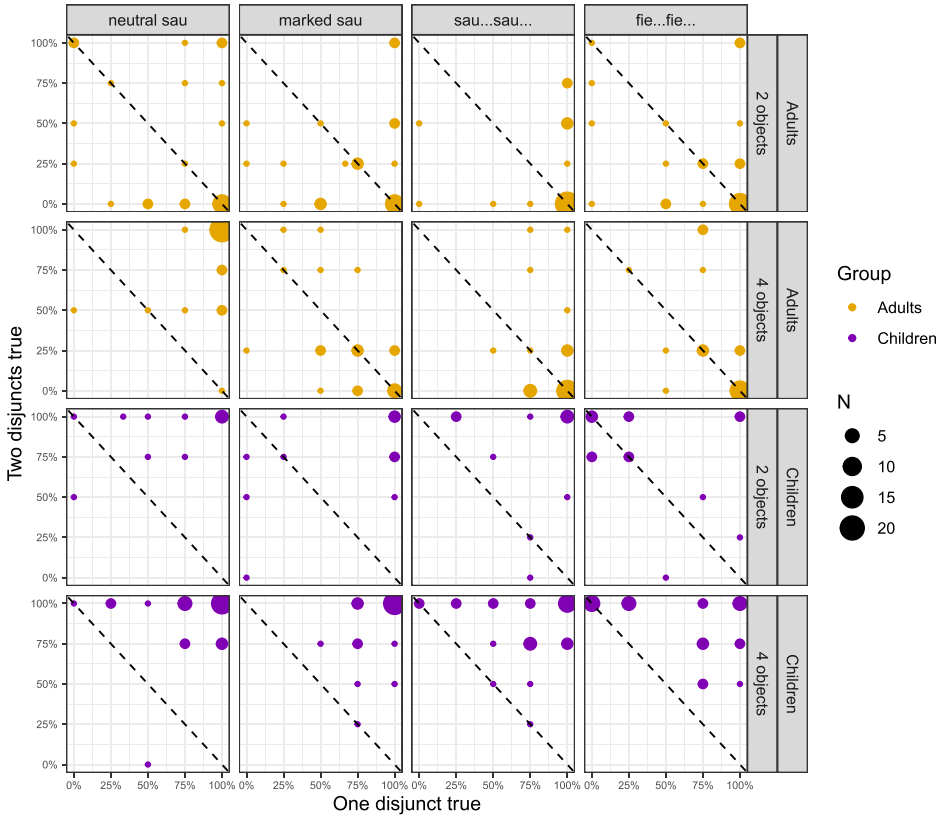


Figure 6. Distribution of participants based on their responses to 1DT and 2DT targets. A participant who accepts both would have an inclusive interpretation and end up in the top-right corner. A participant who accepts only 1DT would have an exclusive interpretation and fall in the bottom-right corner, while a participant who only accepts 2DT would have a conjunctive reading and would be found in the top-left corner. We label participants in the bottom-left corner "contradictory" as they treat the disjunction as always false.

To address these issues, unlike previous studies (Tieu *et al.* 2017; Huang and Crain 2020; Skordos *et al.* 2020), we adopt a lossless graded categorization. For a given participant, we assign a number in [0,1] for each potential reading based on their acceptance rates x_1 and x_2 in 1DT and 2DT conditions, respectively. In addition to the inclusive, exclusive, and conjunctive interpretations discussed in the literature, we include a 'contradictory' category for participants who reject both 1DT and 2DT, which will serve as our baseline for deciding whether a reading is genuinely present or merely due to random errors.[12]

The interpretation rates are defined as follows: the inclusive interpretation is defined as the product x_1x_2, the exclusive interpretation as $x_1(1-x_2)$, the conjunctive interpretation as $(1-x_1)x_2$, and, finally, the contradictory reading as $(1-x_1)(1-x_2)$.[13] For most participants,

[12] While we labeled this category 'contradictory', it is also possible to interpret this response profile as suggesting that these participants simply did not consider disjunctive utterances felicitous in the context of a guessing game, where non-disjunctive utterances would be more optimal as guesses. Note that using this category as our baseline may be too liberal: starting from an inclusive interpretation, independent random errors on 1DT and 2DT items are more likely to result in a conjunctive or exclusive profile than a contradictory one. Nevertheless, the clear asymmetry between conjunctive and exclusive readings observed in children suggests that pure random errors cannot explain our data.

[13] The reader can verify that these coefficients always sum up to 1.

this amounts to a discrete categorization as x_1, x_2 are 0 or 1, but this approach allows us to include mixed participants in the analysis, and to take into account signs of hesitation between two readings for participants who were previously strictly categorized. For example, a participant who accepted 3 out of 4 trials in both 1DT and 2DT would be described as 56% inclusive, 19% exclusive, 19% conjunctive, and 6% contradictory.[14] Most importantly, this transformation is invertible (we can retrieve the proportion of Yes answers to the 1DT and 2DT trials from the rates), so no information is lost in the transformation.

We then ran a Bayesian model on this data to fit a distribution to the rates of each interpretation in all task×disjunction conditions. Details of the model are presented in B. Priors for all model parameters were based on the results of previous studies (Tieu *et al.* 2017, Huang and Crain 2020, Skordos *et al.* 2020), and the script to generate these priors can be found in the OSF repository: https://osf.io/ewc6v/?view_only=a97edb54b7124b2a99912e421843b321. The model was fitted independently for children and adults with 8 chains of 1000 warm-up iterations and 1000 post-warm-up samples. Both models converged without any issue.

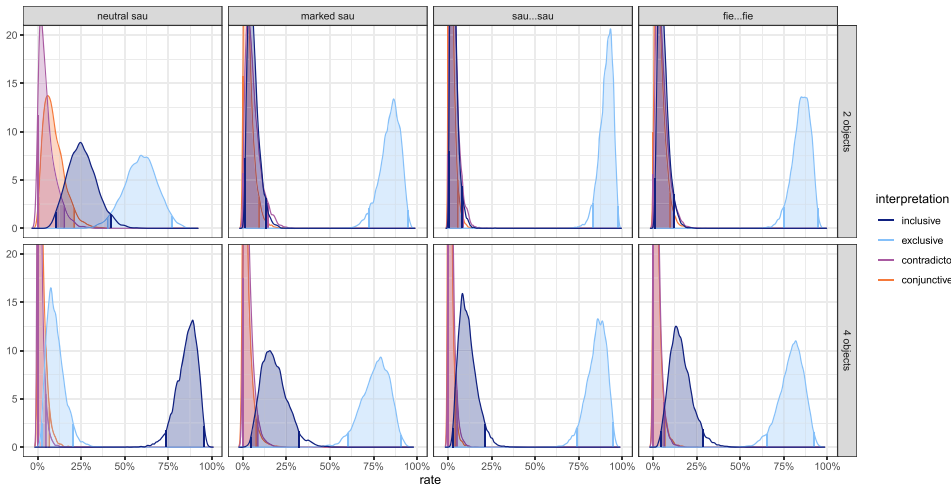
Figure 7 displays the posterior estimated rate parameter for each reading in each condition. In Table 2, we report the overall posterior average parameter of each theoretically relevant reading for children with its 95% highest density credible interval, and the posterior probability that the parameter for this reading is higher than that of 'contradictory' interpretations, which we interpret as a diagnosis that a reading is genuinely accessible to children and not merely due to errors.[15] Table 3 presents the results for adults.

Next, we can probe the main effect of task on the different interpretations across disjunctions. For children, we find clear evidence that the rate parameter for inclusive readings increased in the 4-objects task ($\Delta\rho = 0.255$, CI $[0.034, 0.474]$, $P(\Delta\rho > 0) = 0.992$), while the parameters of all other readings decreased (exclusive: $\Delta\rho = -0.024$, CI $[-0.100, 0.034]$, $P(\Delta\rho > 0) = 0.203$, conjunctive: $\Delta\rho = -0.193$, CI $[-0.415, 0.006]$, $P(\Delta\rho > 0) = 0.022$, contradictory: $\Delta\rho = -0.037$, CI $[-0.120, 0.016]$, $P(\Delta\rho > 0) = 0.072$). For adults, we also find an increase in inclusive interpretations ($\Delta\rho = 0.225$, CI $[-0.002, 0.695]$, $P(\Delta\rho > 0) = 0.985$) and a decrease in exclusive interpretations ($\Delta\rho = -0.171$, CI $[-0.596, 0.076]$, $P(\Delta\rho > 0) = 0.135$). The effect in adults is in part driven by neutral *sau*, but note that the model included an interaction effect, and that the parameter for inclusive readings also increased for all other disjunctions in the 4-objects task. While there was an impact of the task on the parameter for inclusive readings, the effect sizes are moderate (all differences below 20%) and the credible intervals for these effects overlap with 0.

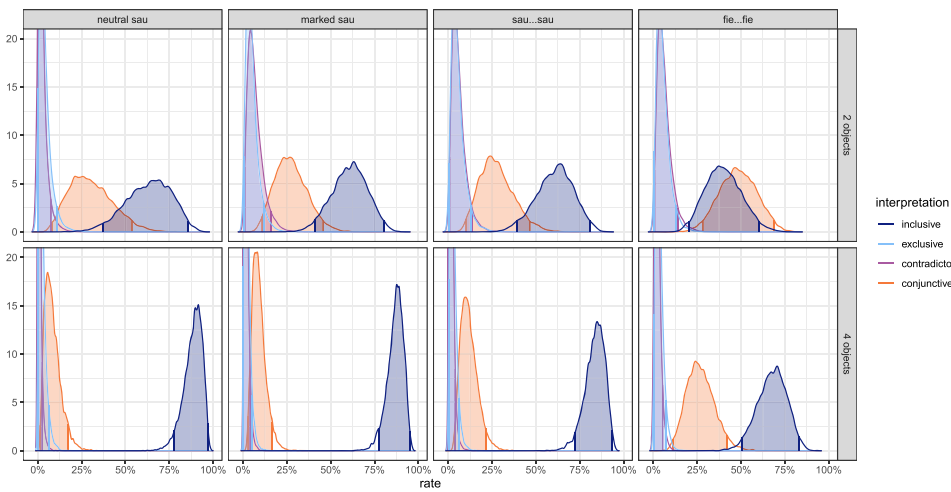
Finally, we can look at differences between disjunctions. Systematically estimating and testing these differences would require more data, so we will only make a few general observations. Adults only seem to distinguish neutral *sau* from all other disjunctions and access

[14] At first glance, one might assume that a participant who accepted 3 out of 4 trials in both 1DT and 2DT should be categorized as 75% inclusive and 25% contradictory. However, this overlooks the fact that in our design Condition is within-participant but between-items. This means that, for a given participant, we cannot pair specific responses to 1DT with specific responses to 2DT. Assuming that responses to 1DT and 2DT are independent, a participant who accepts 1DT and 2DT at 75% each would have a $0.75 \times 0.75 \approx 0.56$ probability of accepting both at the same time, hence our inclusive rate. Another way to look at this is that if we formed 4 sets of paired 1DT-2DT responses, we could obtain either 1 contradictory and 3 inclusive pairs, or 1 conjunctive, 1 exclusive, and 2 inclusive pairs. One can verify that there are 4 possible combinations resulting in the first option and 12 combinations resulting in the latter, so that the average rates correspond once again to our products. For the inclusive response pattern, for instance, $\frac{4\times\frac{3}{4}+12\times\frac{2}{4}}{4+12}$ returns again $\frac{9}{16} \approx 0.56$.

[15] Since we compared each candidate reading with the 'contradictory' reading, we were concerned that the results might reflect the very low prior for this contradictory reading. As a post-hoc analysis, we refitted the model on child data with weak priors that did not favor any interpretation, and obtained nearly identical results. The estimated conjunctive rate parameter was slightly higher for *sau . . . sau* and lower for all other conjunctions. In the 2-objects task, it was not significantly higher than the contradictory reading for neutral and marked *sau*, but this was mainly due to a higher contradictory baseline.



(a) Adults



(b) Children

Figure 7. Posterior distribution of rate parameter for each reading across groups and conditions. The 95% highest-density interval is highlighted for each parameter.

more inclusive readings for it, especially when the scene contains four objects. Children, on the other hand, seem to treat *fie . . . fie* differently by interpreting it more conjunctively, while they do not make much of a distinction among the *sau*-based disjunctions. For children, there is no obvious interaction with task: the additional objects reduce the rate of conjunctive interpretations across the board, without eliminating them.

5 Discussion

In this section, we will discuss in more detail the role of the task, the possible sources for the conjunctive interpretations of *fie . . . fie*, and the role of prosodic and morphological markedness.

Table 2. Graded category model on child data: estimated rate parameter for each reading, 95% Credible interval, and posterior probability that the parameter exceeds the parameter for contradictory readings.

Task	Disjunction	Reading	Estimate	95% CI	$p_{>\text{contr}}$
2 objs	neutral *sau*	Inclusive	63.2%	[37.4%, 85.8%]	1.000
		Exclusive	4.0%	[0.2%, 10.7%]	0.685
		Conjunctive	30.4%	[8.2%, 53.7%]	0.997
	marked *sau*	Inclusive	60.8%	[41.2%, 80.3%]	1.000
		Exclusive	5.0%	[0.4%, 11.9%]	0.367
		Conjunctive	27.3%	[10.9%, 45.7%]	0.979
	sau . . . sau	Inclusive	60.8%	[39.3%, 80.7%]	1.000
		Exclusive	5.6%	[0.4%, 13.0%]	0.470
		Conjunctive	27.7%	[10.2%, 46.5%]	0.988
	fie . . . fie	Inclusive	40.0%	[20.5%, 60.1%]	0.999
		Exclusive	5.4%	[0.6%, 12.7%]	0.437
		Conjunctive	48.3%	[28.2%, 68.9%]	0.999
4 objs	neutral *sau*	Inclusive	88.5%	[77.9%, 97.0%]	1.000
		Exclusive	2.3%	[0.1%, 6.1%]	0.825
		Conjunctive	8.5%	[1.4%, 17.4%]	0.996
	marked *sau*	Inclusive	86.9%	[77.6%, 95.2%]	1.000
		Exclusive	2.3%	[0.2%, 5.3%]	0.622
		Conjunctive	9.1%	[2.9%, 16.8%]	0.994
	sau . . . sau	Inclusive	83.7%	[72.5%, 93.5%]	1.000
		Exclusive	2.7%	[0.3%, 6.2%]	0.690
		Conjunctive	11.9%	[3.7%, 21.3%]	0.997
	fie . . . fie	Inclusive	67.7%	[50.8%, 83.0%]	1.000
		Exclusive	3.2%	[0.4%, 7.2%]	0.672
		Conjunctive	26.9%	[11.3%, 42.0%]	1.000

5.1 Is the conjunctive interpretation of disjunction a mere task effect?

Regarding our first research question (Q1), our results allow us to make two main observations regarding task effects. The first is that task design matters, such that: (i) in the presence of additional objects in the display, adults become much more inclusive with neutral *sau* and slightly less exclusive with the other disjunctions; and (ii) children become more inclusive and less conjunctive. The second observation is that for children, even in the presence of unmentioned objects, the conjunctive interpretation remains present at a rate significantly higher than errors (the 95% credible interval for Conjunctive does not overlap with that of Contradictory for any of the four disjunctions). By contrast, the exclusive interpretation is only present at a rate two to three times lower than the conjunctive interpretation, and its credible interval overlaps with contradictory interpretations in all conditions.

The effect of task in adults The 4-object task allows the inclusive reading to resurface for adults, but only with neutral *sau*. This is compatible with a high-level interpretation of the task effect, whereby the 2-object task artificially overestimates exhaustive interpretations (which correspond to the exclusive reading in adults and to conjunctive or exclusive readings in children). The reason it affects neutral *sau* more dramatically in adults would be that the other disjunctions are already at ceiling in terms of the rate of exhaustive interpretations.

The effect of task in children While the original task with only two objects may have overestimated the rates of conjunctive readings for children, it seems clear that this interpretation remains available to at least some children in the presence of additional objects; this is true in our results, but also in previous studies (see Skordos *et al.*, 2020 where 4 children were conjunctive in the experiment with additional objects, and Huang and Crain 2020, where 6 out of 22 children rejected disjunctive statements 50% of the time when one disjunct was true). The conjunctive interpretation is particularly salient for *fie . . . fie*, to the

Table 3. Graded category model on adult data: estimated rate parameter for each reading, 95% Credible interval, and posterior probability that the parameter exceeds the parameter for contradictory readings.

Task	Disjunction	Reading	Estimate	95% CI	$p_{>\text{contr}}$
2 objs	neutral *sau*	Inclusive	25.7%	[10.3%, 42.2%]	0.979
		Exclusive	59.2%	[40.2%, 77.1%]	1.000
		Conjunctive	9.5%	[0.6%, 21.0%]	0.692
	marked *sau*	Inclusive	6.2%	[1.4%, 13.2%]	0.552
		Exclusive	84.4%	[72.7%, 94.7%]	1.000
		Conjunctive	3.4%	[0.1%, 9.4%]	0.315
	sau . . . sau	Inclusive	3.5%	[0.5%, 7.8%]	0.503
		Exclusive	90.7%	[83.1%, 97.5%]	1.000
		Conjunctive	2.1%	[0.0%, 5.6%]	0.298
	fie . . . fie	Inclusive	5.8%	[1.2%, 11.9%]	0.592
		Exclusive	85.1%	[75.0%, 94.3%]	1.000
		Conjunctive	4.0%	[0.1%, 9.7%]	0.412
4 objs	neutral *sau*	Inclusive	85.6%	[73.9%, 95.7%]	1.000
		Exclusive	10.5%	[2.3%, 20.6%]	0.984
		Conjunctive	2.4%	[0.0%, 6.8%]	0.641
	marked *sau*	Inclusive	18.3%	[4.6%, 32.0%]	0.988
		Exclusive	76.1%	[60.1%, 90.7%]	1.000
		Conjunctive	2.4%	[0.0%, 7.7%]	0.376
	sau . . . sau	Inclusive	11.4%	[2.8%, 21.4%]	0.990
		Exclusive	85.2%	[73.8%, 94.8%]	1.000
		Conjunctive	1.4%	[0.0%, 4.2%]	0.373
	fie . . . fie	Inclusive	15.9%	[4.6%, 28.4%]	0.993
		Exclusive	79.3%	[65.2%, 92.1%]	1.000
		Conjunctive	2.3%	[0.0%, 6.7%]	0.449

point that one may legitimately question whether children really understand this expression as a disjunction. Nevertheless, there is also some evidence for conjunctive interpretations even for *sau*-based disjunctions in the 4-objects task, even though this evidence comes mainly from mixed participants (see Fig. 6).

The lower rate of conjunctive interpretations when comparing the 2-objects task to the 4-objects task can be explained by *Artifact accounts* in terms of children's sensitivity to informativeness or plausible dissent (see Skordos *et al*. 2020, and Huang and Crain 2020, as well as Section 2.3 of the current paper). The conjunctive answers that persist in the 4-objects task, however, require different explanations (e.g. alternatives, conjunctive default, syncretism). Combining any of these accounts with an *Artifact account* could provide a comprehensive explanation for the observed conjunctive responses. In the following subsections, we turn to a discussion of the possible sources of children's conjunctive behaviour in the 4-objects task.

5.2 Possible sources of the conjunctive interpretation of *fie . . . fie* in the 4-objects task

Fie . . . fie is the only disjunction for which the rate of conjunctive readings was higher than that of inclusive readings in the 2-objects task, and remained high even after task manipulation, suggesting that the presence of such interpretations cannot be attributed (solely) to a task effect. That is, more needs to be said about why this disjunction, but not the others, shows the interpretive pattern that it does. In what follows, we review several possible accounts.

5.2.1 The Alternatives-based approach

According to the *Alternatives-based approach* (Barner *et al.* 2011; Singh *et al.* 2016; Tieu *et al.* 2017), children's non-adult-like interpretations can be explained by the fact that they do not access the same alternatives that adults do. This approach assumes that children do have access to exhaustification, a mechanism for strengthening meanings (Barner *et al.* 2011). Like adults, children take disjunction to be inclusive at its core, and enrich its meaning by negating relevant alternatives. However, unlike adults, children do not access the conjunctive alternative. According to Singh *et al.* (2016), the relevant alternatives to disjunctive utterances for adults include each individual disjunct, as well as the stronger conjunctive alternative (14-a). In contrast, children consider only the alternatives in (14-b).

(14) Possible alternatives to 'A or B'
  a. Adults: $\{A, B, A \wedge B\}$
  b. Children: $\{A, B\}$

Importantly, as explained in Section 2.1, children arrive at the conjunctive interpretation of disjunction by negating the strengthened versions of the individual disjuncts, namely *only A* and *only B*, separately, and then conjoining them with the assertion (see examples (5) and (8) for a detailed description of the process). Notably, the Alternatives-based approach assumes continuity between the child and the adult grammar in terms of the semantics of disjunction and the implicature mechanism (i.e. exhaustification), but leaves space for differences regarding the set of alternatives available to each group. The child matures into the adult state as their capacity to compute alternatives expands to include richer sets, such as $\{A, B, A \wedge B\}$, thereby yielding strengthened exclusive interpretations. On this view, the path from child to adult lies in the gradual refinement of the alternatives available for scalar reasoning.

While the *Alternatives-based account* can explain the overall differences we observed between children and adults, it does not immediately explain the differences between disjunctions for children, namely why not all disjunctions were interpreted conjunctively at the same rate. If children take longer to realize that conjunction is an alternative to *fie . . . fie* compared to the *sau*-based disjunctions, we should expect relatively more exclusive readings for the latter, rather than inclusive ones. To explain the inclusive reading of the other disjunctions, Singh *et al.*'s (2016) account would need to assume either that (i) for such disjunctions children do not access any alternatives, not even those represented by the individual disjuncts, or (ii) for such disjunctions they resist strengthening altogether (e.g. by assuming a different Question Under Discussion).

While our findings could be accounted for by assuming this split between disjunctions, it is unclear why the split should be this way rather than the other way around, that is, why *fie . . . fie*, rather than the *sau*-based disjunctions, should be conjunctive. In the following subsections, we explore other possibilities that might bring us closer to an answer.

5.2.2 Conjunction as a default meaning

One possibility is that children ascribe to *fie . . . fie* a non-adult-like meaning. Recall that *fie . . . fie* is a low frequency disjunction, in both child speech and child-directed speech. Given its low frequency, as well as the similar distributions of disjunction and conjunction, it could be argued that (at least some) children do not know whether the connective signifies disjunction or conjunction, and that in such cases, they default to a conjunctive interpretation. This would represent a version of the *Ambiguity Approach*, which posits that disjunctions are in fact ambiguous between disjunctive and conjunctive interpretations, with the *Strongest Meaning Principle* leading children to default to a conjunctive interpretation in

positive linguistic environments. Alternatively, given the similar distribution of conjunction and disjunction, children might think disjunction has an identical meaning to conjunction.[16]

Another possibility is that, not knowing what *fie … fie* means, children may choose to simply ignore it and instead pay attention to the propositional content and the visual information (Paris 1973). Under such an account, the conjunctive interpretation simply arises because children parse the juxtaposition of several items as a list, disregarding the disjunction. Importantly, the absence of a connective element is often interpreted conjunctively, without the need for an explicit connective (see Heim 1982). Consider *The mouse carried an apple, an orange*, which is interpreted as the mouse having carried an apple and an orange.[17] In the same vein, if children disregard *fie … fie*, then *Șoricelul a cărat fie un măr, fie o portocală* 'The mouse carried either an apple or an orange' may be understood as *Șoricelul a cărat un măr, o portocală* 'The mouse carried an apple, an orange'. Our data do not allow us to tease apart versions of the conjunctive default account in which children attribute a conjunctive meaning to what might be an unknown or partially unknown word and a version in which they simply ignore this unknown word and parse the list of items (connected by the operator) as a juxtaposition.[18]

Importantly, a version of the conjunctive default account, where children start out with a conjunctive meaning of disjunction, has been motivated cognitively as well. According to Aloni *et al.* (2024) and Klochowicz *et al.* (2025), the conjunctive default arises due to two cognitive biases: a neglect-zero bias, which leads children to avoid empty or incompatible scenarios, and a no-split bias, which discourages consideration of multiple alternative states. Development involves gradually acquiring the ability to represent alternatives (yielding an inclusive interpretation), and later, the capacity for scalar reasoning (yielding an exclusive interpretation). In contrast, in an ambiguity account, where children treat *fie … fie* as lexically ambiguous between disjunction and conjunction, maturation involves resolving this ambiguity and settling on the adult, disjunctive-only interpretation: initially inclusive, and later exclusive (with the development of scalar reasoning and the derivation of the full set of alternatives).

Evidence in support of a conjunctive default (whether via ascribing a non-adult-like meaning for disjunction or juxtaposition) is provided by a recent follow-up we conducted (see Bleotu *et al.* 2025c). We tested 3–5-year-old children on the materials from Experiment 1, but we replaced the disjunctions with novel nonce words such as *mo* and *mo…mo*. Strikingly, most children attributed a conjunctive interpretation to sentences such as *Șoricelul a cărat un măr mo portocală* 'The mouse carried an apple mo an orange', as well as to *Șoricelul a cărat*

[16] Note that a conjunctive default has also been postulated for other constructions, beyond disjunction. For instance, children are known to sometimes interpret complex recursive constructions such as *big small flowers* as the conjunctive *big and small flowers*, instead of accessing the adult interpretation of a subset of big flowers out of the set of small flowers (Roeper 2011; Bleotu and Roeper 2021a,b).

[17] Unlike conjunction, which can be inferred without an explicit connective, disjunction typically requires an overt marker like *or* to be interpreted as such (Winter 1995).

[18] It is worth noting that these versions explain the conjunctive interpretation of disjunction without reliance on exhaustification over a constrained set of alternatives. As encouraged by one of the anonymous reviewers, it is valuable to examine the auxiliary assumptions that are required for each account. For instance, on the alternatives-based approach, the conjunctive reading follows as a deductive consequence of independently motivated assumptions, namely, that (i) children possess an adult-like semantics for disjunction, as supported by their behaviour in downward-entailing environments (Chierchia *et al.* 2001; Gualmini *et al.* 2001; Crain *et al.* 2002; Notley *et al.* 2012; Su 2014), (ii) they have access to a strengthening mechanism, as evidenced in contexts that give rise to ad hoc implicatures and free choice inferences (Barner and Bachrach 2010; Barner *et al.* 2011; Tieu *et al.* 2016), (iii) their set of alternatives may exclude the conjunction due to general constraints on lexical replacements (Barner *et al.* 2011), and (iv) free choice inferences in the adult language are computed as a kind of scalar implicature by the same strengthening mechanism in (ii) (Fox 2007). On this view, no additional stipulations are required: the conjunctive reading is entailed by these assumptions. This contrasts with Conjunction as Default accounts, which require different assumptions, such as children lacking a lexical entry for the disjunctive marker and defaulting to a general strategy of interpreting juxtaposed items conjunctively, or assuming that disjunction is lexically ambiguous and initially misanalyzed as conjunction. We acknowledge this as an important dimension for comparison between accounts, which future studies might address.

mo un măr mo o portocală 'The mouse carried mo an apple mo an orange'. Given *fie . . . fie*'s infrequency, it is plausible that it behaves similarly to *mo . . . mo*, i.e. as a novel or unfamiliar construction for children, leading them to default to conjunctive interpretations. This offers a straightforward explanation for the conjunctive readings observed with *fie . . . fie*.

Regardless of the version adopted, the conjunctive default account is conceptually appealing in that it may generalize easily to other cases where children may be uncertain about the meaning of a particular operator, and may default to a non-adult-like interpretation as a result. In particular, if children abide by the Strongest Meaning Hypothesis (Dalrymple *et al.* 1998), they may default to the strongest interpretation possible (in the present case, conjunction). Alternatively, they may default to the simplest or most plausible interpretation in the context (in our case, this may also be conjunction).[19]

Returning to our experimental data, a conjunctive semantics would predict a conjunctive meaning for *fie . . . fie* across the board. What we observed, however, at least in Experiment 2, was that a substantial proportion (close to half) of the children predominantly had conjunctive interpretations, while the rest had inclusive interpretations. This result could be explained in different ways. It could be that these children were at different stages of development, with some still in the *conjunctive default* stage. It could also be that these children were at the same stage of development, call it an *ambiguity stage* (see Sauerland and Yatsushiro 2018, discussed in Section 2.2), where both the inclusive disjunctive meaning and the conjunctive meaning represent default meanings, but some children access the conjunctive meaning, while others access the inclusive meaning.[20] Distinguishing between these two possibilities is difficult given the absence of longitudinal (corpus or experimental) data from Romanian children regarding *fie . . . fie*, which would reveal children's development of disjunction at various stages. It is even possible that both explanations play a role.

5.2.3 The subjunctive/irrealis account

Another possible explanation for children's conjunctive interpretation of disjunction can be traced to the syncretism between *fie* and the present subjunctive form of the verb *a fi* 'to be' (i.e. *să fie*), as shown in (15). The examples in (15) show that the subjunctive mood occurs with both possibility and volitional verbs, as well as with imperatives.

(15) a. Poate să fie obosită.
may.PRS.IND.3 MRK.SBJV be.PRS.SBJV.3 tired.F.SG
'She may be tired.'

b. Maria vrea să fie soare.
Maria want.PRS.IND.3 MRK.SBJV be.PRS.SBJV.3 sun
'Maria wants there to be sun.'

c. Să fie soare!
MRK.SBJV be.PRS.SBJV.3 sun
'Let there be sun!'

Cross-linguistically, building disjunctive markers from the subjunctive is quite common. In a detailed typological investigation, Mauri (2008a,b) shows that many languages appeal

[19] As pointed out by an anonymous reviewer, Clark (1973) demonstrates that children with limited or no semantic knowledge of prepositions often rely on default pragmatic and non-linguistic assumptions to interpret a phrase such as *put the toy on the box* as asking the child to put the toy in the box.

[20] Note, however, that this alone would not explain the task effect. If (some) children assigned only a conjunctive semantics to *fie . . . fie*, it is unclear why the inclusion of more items in the scene would make them switch to a disjunctive interpretation. On the other hand, if we assume an ambiguous semantics for *fie . . . fie*, with conjunction and inclusive disjunction as its two meanings, then one could argue that children are sensitive to the context such that when there are only two objects, they prefer to go for the stronger conjunctive reading when the disjunctive one is too weak. Additional reasons may involve Huang and Crain's (2020) Informativeness Account or Skordos *et al.*'s (2020) Plausible Dissent Account.

to irrealis markers to express disjunction, quite similarly to what we see in the case of Romanian *fie . . . fie*, as well as French *soit . . . soit*.

The subjunctive is generally assumed to be a dependent mood, with its modal force and flavour depending on the embedding element (Quer 1998). It acquires existential force (possibility) if embedded under the modal *poate* 'may' (see example (16)) or universal force (necessity) if embedded under the strong intensional verb *vrea* 'to want' (see example (17)) (Farkas 1984; Giorgi and Pianesi 1997; Cotfas 2017). In main affirmative declarative contexts where it is not embedded, such as (15-c), the use of the subjunctive in Romance languages (including Romanian) and Greek gives rise to an interpretation most closely resembling that of an imperative.[21] Interestingly, even in such matrix sentence contexts, the analysis of imperatives has been subject to debate: some authors argue that it involves a universal modal operator (Schwager 2006), that it is ambiguous between a possibility and necessity modal (Grosz 2008), or that it involves a possibility modal and pragmatic strengthening to directive force (Oikonomou 2016).

Returning to the data we are interested in, there is no formal proposal for how the disjunctive interpretation of constructions built off of the subjunctive comes about, and whether the morphological make-up should even be taken into consideration when providing a semantics for these constructions. We could, nevertheless, envision such an account for the interpretation of *fie . . . fie* where children do draw on the syncretism between the disjunction *fie . . . fie* and the subjunctive marker *fie*, and then extend the meaning of the subjunctive (or at least what we think their interpretation of it is) to the meaning of the disjunction. In connection with this, observe that the subjunctive can occur not just once, as in (15), but also multiple times, as in (16)–(18).

(16) Poate să fie obosită, să fie
may.PRS.IND.3 MRK.SBJV be.PRS.SBJV.3 tired.F.SG, MRK.SBJV be.PRS.SBJV.3
supărată.
upset.F.SG
'She may be tired, may be upset.'

(17) Maria vrea să fie soare, să
Maria want.PRS.IND.3 MRK.SBJV be.PRS.SBJV.3 sun, MRK.SBJV
fie căldură.
be.PRS.SBJV.3 warmth
'Maria wants there to be sun and warmth.'

(18) Să fie soare, să fie căldură.
MRK.SBJV be.PRS.SBJV.3 sun, MRK.SBJV be.PRS.SBJV.3 warmth
'Let there be sun and warmth.'

In discourse, juxtaposed parallel structures such as the subjunctives above are interpreted as conjoined. We can thus postulate that children generalize the interpretation of such constructions to the *fie . . . fie* disjunction as well; in other words, they interpret the connective *fie . . . fie* as a conjunction. One question that still lingers, however, is what children take the contribution of *fie* to be in such constructions. It could be that they ignore it completely, or that they assign a modal interpretation to it. We discuss each possibility in turn below.

[21] Such uses may also be argued to be associated with embedding under a covert deontic operator (see discussions in Oikonomou 2016 and Schwager 2006, for instance).

Simplification of irrealis

One possibility is that children simply ignore the subjunctive marker, avoiding its complexity in favour of a simpler structure, devoid of subjunctives: 'be it A, be it B' is taken as 'A, B', a juxtaposition equivalent to 'A and B'.

There is evidence from corpus data and experiments suggesting that children struggle with the irrealis mood; they have been found to deny the counterfactual, taking it as factual (19), to use the present instead of the subjunctive (20), and to use the subjunctive to refer to real facts (21):

(19) Adult: What if you were a snake? (Quer 1998 116, ex. 57)
Janine (3;0): I'm not a snake. / I'm Janine.

(20) Adam (5;2): I wish I have a banjo like dis [this]. (Brown 1973)

(21) Laura (3;2): I wish you were my mommy. (Braunwald 1971)

We take this as support for the claim that children might resort to simplification when handling the subjunctive, leading them to ultimately treat the irrealis mood as realis (Tulling and Cournane 2022), and thus interpret *fie . . . fie* as the juxtaposition/conjunction of two un-modalized propositions.

On the other hand, given the multiplicity of interpretations associated with the subjunctive, another possibility is that children may associate *fie . . . fie* with either existential or universal force.

Conjunction of modalized propositions

If children default to a necessity modal interpretation for the subjunctive, their conjunctive interpretation of such constructions would fall out straightforwardly given the interpretation in (22).

(22) $[\![\text{be it A, be it B}]\!] = \Box A \wedge \Box B$

Similarly to the simplification account, we would have to claim that those children who assign an inclusive interpretation to *fie . . . fie* have already reached a stage of development where they assign it an adult interpretation.

Finally, children might analyze the juxtaposition of the subjunctives as the conjunction of two possibility modals, along the lines of Zimmermann's (2000) account of the conjunctive interpretation of disjunction, as in (23).

(23) $[\![\text{be it A, be it B}]\!] = \Diamond A \wedge \Diamond B$

Notice that such an interpretation is weaker than a conjunctive one. We would therefore need to ask ourselves why children reject predictions involving this construction in cases where only one of the disjuncts is realized, that is, in 1DT scenarios, since (23) is consistent with only one of the two being true.

It seems that (some) children strengthen the existential modal operator into a necessity one via what has recently been dubbed a *scaleless implicature* by Jeretič (2021) (but see also Deal (2011) for a similar proposal). Under this view, children go from 'be it A, be it B' to 'must be A and must be B' by strengthening $\Diamond A$ to $\Box A$ and $\Diamond B$ to $\Box B$.[22] The result of conjoining the strengthened propositions 'must be A and must be B' is, naturally, equivalent to their conjunction.

[22] This is in line with findings from the developmental literature that suggest that children may sometimes have a non-adult-like understanding of possibility (see Noveck *et al.* 1996; Ozturk and Papafragou 2015; Leahy and Carey 2020; Bleotu *et al.* 2021; Leahy and Žalnieriūnas 2021; Dieuleveut *et al.* 2022, among others).

Taking stock

Here we have suggested that while adults are able to reliably distinguish between the subjunctive and the disjunctive marker, children are unable to do so, treating the disjunctive marker as a subjunctive form. The simplification account and the conjunction of modalized propositions account differ in what assumptions they make about how children will behave with respect to the subjunctive. The simplification account assumes that children will simply ignore the subjunctive marker(s) and interpret the construction as the juxtaposition of two un-modalized propositions. In contrast, the conjunction of modalized propositions account assumes that children decompose the disjunctive marker as the conjunction of two modal elements. If children take the modal elements to be necessity modals, the conjunctive meaning arises naturally. If children take the modal elements to be possibility modals, we propose that they process them in a different manner from adults, namely by strengthening the modal force.[23] Future experimental work could aim to tease these accounts apart.

One attractive aspect of the general idea that the conjunctive meaning of disjunction draws on the syncretism with the subjunctive is the fact that this explanation is in line with a one-to-one mapping between form and meaning, which often characterizes child language (Slobin 1973; van Hout 1998). Children will treat *fie* as the same *subjunctive* word in all the contexts where it appears, strengthening it or simplifying it. This would explain why there are many more conjunctive interpretations for *fie . . . fie* than for *sau*-based disjunctions: only *fie . . . fie* is morphologically syncretic with the subjunctive, while *sau*-based disjunctions are not.

Such an account has not, to our knowledge, been previously provided to account for the conjunctive interpretations of disjunction in children. Note that this differs from the proposal in Zimmermann (2000) and Geurts (2005), who argue that all disjunctions should be reduced to conjoined possibilities, that is, that there is no disjunctive primitive in natural language. We are simply proposing that, in the case of *fie . . . fie*, children may resort to this intermediate interpretation in order to ultimately arrive at the conjunctive interpretation. Such a proposal remains to be further tested by comparing children's interpretation of disjunction to their interpretation of other modalized constructions.

Importantly, while we have reviewed above various possible explanations for the conjunctive interpretation of *fie . . . fie*, we refrain from committing to any of them. The crucial conclusion we can draw is that the conjunctive interpretation is not merely a task effect, but rather that there is something genuinely semantic/pragmatic at stake. We leave open whether the conjunctive interpretation reflects a semantic default, arises via double exhaustification, or results from syncretism with the present subjunctive form of the verb *to be*.

Finally, as noted by one of the anonymous reviewers, we have presented here both cognitive mechanisms that enable conjunctive interpretations, and factors that might determine which interpretation is selected. However, these mechanisms and selection strategies are independent and may combine in various ways. Different cognitive mechanisms may underlie how conjunctive readings become available, yet the same pragmatic or contextual factors might drive their selection. For example, a child might be able to interpret *fie...fie* conjunctively through recursive exhaustification (Alternatives-Based approach) or via lexical ambiguity, but use a principle such as Strongest Meaning to select the conjunctive interpretation over the inclusive one. Alternatively, even if the cognitive mechanism is the same, different factors may be argued to guide the interpretation choice (Chemla and Singh 2014a,b). Within the Alternatives-based approach, for instance, some attribute conjunctive preferences to differences in the set of alternatives (Chemla and Bott 2014; Sauerland *et al.* 2017; Bar-Lev 2018), while others argue for a QUD-based approach (Singh 2025). Future research should separately explore mechanisms and selection strategies to clarify

[23] In theory, adults could also be argued to decompose disjunction as the conjunction of two possibility modals, but we do not discuss this line of analysis here (see Zimmermann 2000).

their interaction. We are very grateful to an anonymous reviewer for pushing us to make this distinction clear in the text.

5.3 Possible sources of the conjunctive interpretation of *sau*-based disjunctions in the 4-objects task

While there were a considerable number of conjunctive responses with *fie . . . fie* in the 4-objects task, there were also conjunctive responses with *sau*-based disjunctions (see Fig. 6). The existence of these responses could be explained in various ways, including the possibilities we identified for explaining conjunctive interpretations of *fie . . . fie*. That is, they could correspond to a conjunctive implicature under the Alternatives-based approach, or to a default meaning in the Ambiguity or Conjunctive Default approaches.[24]

One possible reason why children might be less likely to derive or default to a conjunctive meaning for the *sau*-based disjunctions than for *fie . . . fie* is the higher frequency of *sau*-based disjunctions in present-day Romanian. Greater exposure to *sau*-based disjunctions presumably leads to more familiarity with their target meanings. Notably, most conjunctive responses for *sau*-based disjunctions came from children oscillating between conjunctive and inclusive interpretations. This is compatible with an Ambiguity Approach, where disjunctions are interpreted as ambiguous between inclusivity and conjunctivity.

The observed differences between the disjunctions in Romanian suggest that linguistic properties (such as frequency or morphological syncretism) alongside task effects, shape interpretation, offering a broader perspective on conjunctive readings that goes beyond mere experimental artifacts. These factors should also be considered in studies of disjunction in other languages.

5.4 The role of markedness

In the previous subsections, we argued that the conjunctive interpretation for the connective *fie . . . fie* cannot be explained away as a mere artifact of the task, and we offered a number of possible accounts for what might be going on. Although our statistical analyses focused on the first research question, we would now like to make some observations about markedness on the basis of the results. Descriptively, our findings differ from previous developmental studies of disjunction, which found no difference between simple and complex disjunctions. This suggests that, to arrive at a clearer understanding of disjunction(s) cross-linguistically, it is important to examine multiple disjunctions across languages rather than focus on any one type of disjunction in a single language. We should not assume that a lack of effect of markedness in one language will carry over to other languages. Moreover, we should be careful before generalizing our findings from one disjunction type to another.

Our results allow us to draw the following observations regarding the effects of markedness:

1. Adults are sensitive to both prosodic and morphological markedness, as indicated by their behaviour in Experiment 2: while they are generally inclusive with neutral *sau*, they are more exclusive with prosodically marked *sau* and with the morphologically marked (complex) disjunctions *sau . . . sau* and *fie . . . fie*.[25, 26]
2. Children do not appear to be sensitive to the marked status of prosodically marked *sau* (in line with previous findings from Bleotu *et al.* 2024) or the complex *sau . . . sau*, as

[24] Unlike *fie . . . fie*, *sau*-based disjunctions do not contain elements syncretic with subjunctive forms, making the previously discussed subjunctive irrealis account specific to *fie . . . fie*.

[25] These results confirm what has independently been found in a larger scale study on the exclusivity status of simplex and complex disjunctions cross-linguistically (Nicolae *et al.* 2024, 2025).

[26] Note that the morphologically complex disjunctions can also be argued to involve prosodic markedness, given the presence of two prosodic units, just as in the case of marked *sau* and in contrast to neutral *sau*.

indicated by the fact that they interpreted both marked and reduplicated *sau* similarly to the neutral variant.

3. Children appear to be sensitive to some features of the disjunction *fie . . . fie*, which contains the repeated marker *fie*, showing conjunctive behaviour to a considerable extent in both experiments.

Children's responses in relation to morphological markedness can be looked at from various angles. If we understand morphological markedness as reduplication, then *fie . . . fie* could be considered marked in spite of its lacking a simple *fie* counterpart. However, if the reason for the conjunctive interpretation were reduplication, we would perhaps have expected both complex disjunctions *sau . . . sau* and *fie . . . fie* to receive similar rates of conjunctive interpretations. Since *fie . . . fie* is interpreted conjunctively to a greater extent, the reason may have to do with other existing differences among the two complex disjunctions: (i) the subjunctive source of *fie . . . fie* vs. the absence of such a source for *sau . . . sau*; (ii) the absence of a simple connective counterpart *fie* for *fie . . . fie* vs. the existence of a simple connective *sau* for *sau . . . sau*, leading to a possible over-generalization of the inclusive meaning of *sau* to *sau . . . sau*; (iii) the higher frequency of *sau . . . sau* compared to *fie . . . fie*. If, on the other hand, we understand morphological markedness as involving a contrastive/marked form with respect to a simpler existing form, then *fie . . . fie* could be treated as unmarked given its lack of a simpler (connective) counterpart. If this is the case, then one could argue that children are overall not sensitive to morphological markedness. The interpretation of the results is thus contingent on one's definition of markedness. Despite the multiple factors distinguishing *fie . . . fie* from the other disjunctions, one thing we can conclude is that reduplication cannot be the sole reason for a difference between *fie . . . fie* and *sau . . . sau*, since *sau . . . sau*, despite involving reduplication, led to more inclusive interpretations than *fie . . . fie*.

In an earlier discussion (see Section 2.2), we referenced Spector's (2014) proposal that complex (morphologically marked) disjunctions are obligatorily exhaustified in adult language, resulting in an exclusive interpretation. One could ask whether children have learned to associate complex disjunctions with obligatory EXH. The situation seems to be quite different in child Romanian (and more generally in child language): (i) the only type of strengthening we observe is to conjunctive interpretations, and (ii) not all marked disjunctions are associated with strengthened interpretations (only *fie . . . fie* is). Even if we assume, for the sake of argument, that the conjunctive interpretation is not derived via exhaustification, the absence of exclusive interpretations of complex disjunctions does not necessarily mean that children do not obligatorily exhaustify.[27] As already discussed in Section 5.2.1, even if children associate certain disjunctions with obligatory exhaustification, this will not necessarily affect their interpretation if they don't also have access to the relevant conjunctive alternative. That is, we cannot know for sure whether children have or have not acquired the notion that complex disjunctions are obligatorily associated with EXH.

While our current findings do not allow us to disentangle the various possible explanations, the empirical finding remains that not all complex disjunctions behave alike. This highlights the relevance of examining multiple types of disjunctions across languages.

6 Conclusion

To conclude, we have presented experimental evidence suggesting that Romanian children's conjunctive interpretation of disjunction is a genuine semantic-pragmatic interpretation that arises to a considerable extent, even when there are additional objects in the background that are not mentioned in the disjunctive statement. Importantly, our research builds on

[27] Children are generally assumed to be able to exhaustify, see Barner *et al.* (2011).

the findings in Huang and Crain (2020) and Skordos *et al.* (2020), showing that, while the conjunctive interpretation is partly a task effect, it is not solely that. Interestingly, conjunctive interpretations seem to be more frequent with certain disjunctions (such as *fie . . . fie* in Romanian) than with others (such as *sau*-based disjunctions in Romanian). We discussed possible accounts for the availability of conjunctive interpretations in light of our results: the data may be compatible with an alternatives-based account, a conjunctive default or ambiguity account, as well as with a subjunctive syncretism account in the case of *fie . . . fie*. While all three accounts are plausible, we refrain from fully committing to a single account given their various limitations. The varying acquisition paths of different disjunction types highlight the need for a more fine-grained cross-linguistic investigation.

Ethics and consent

Data collection for this study was approved by the Research Ethics Committee at the University of Bucharest (89/ 20.03.2023), and consent was obtained from all participants (adults, children, and their legal guardians).

Acknowledgements

The current research was supported by the project *The Acquisition of Disjunction in Romanian* (TE140/2022, PN-III-P1-1.1-TE-2021-0547), awarded to P.I. Adina Camelia Bleotu (and team members Rodica Ivan, Gabriela Bîlbîie, Mara Panaitescu, and Monica Casa). Open access funding has been provided by the University of Vienna, one of Adina Camelia Bleotu's current affiliations (she is also affiliated with the University of Bucharest). Andreea Nicolae was supported by the DFG grant NI-1850/2-1, as well as by the ERC Synergy Grant 856421 (LeibnizDream). Lyn Tieu was supported in part by funding from the Social Sciences and Humanities Research Council of Canada and the Connaught Fund. Anton Benz's work was partly funded by the "Linguistic Meaning and Bayesian Modeling" project within the Leibniz Collaborative Excellence Programme (PI Anton Benz, Application number: K535/2023). We would like to thank Hannah Hullmeine for help with the stimuli and Dorothy Ahn for allowing us to use her illustrations in our stimuli. We thank the students at the University of Bucharest for taking part in the experiments, our research assistants for help with data collection, and the children from No. 248 Kindergarten and Dreamland Kindergarten in Bucharest for their participation. We are also indebted to Monica Casa, who helped us with the corpus analysis of disjunctions in Romanian. For helpful feedback, we also extend our thanks to Tom Roeper, William Snyder, Deborah Foucault, Iain Giblin, Maria Aloni, Tomasz Klochowicz, and the audiences at presentations at the University of Toronto, Macquarie University, Western Sydney University, *Sinn und Bedeutung*, and *XPrag 2023*.

Data availability

The data and code associated with this paper can be consulted at: https://osf.io/ewc6v/?view_only=a97edb54b7124b2a99912e421843b321.

Competing interests

The authors have no competing interests to declare.

CRediT authorship contribution statement

Conceptualization: Adina Camelia Bleotu, Andreea Nicolae, Lyn Tieu, Anton Benz, Alexandre Cremers, Gabriela Bîlbîie, Mara Panaitescu, and Rudmila Rodica Ivan
Data curation: Adina Camelia Bleotu, Alexandre Cremers
Formal analyses: Alexandre Cremers
Funding acquisition: Adina Camelia Bleotu, Rudmila Rodica Ivan, Andreea Nicolae
Investigation: Adina Camelia Bleotu, Gabriela Bîlbîie, Mara Panaitescu
Methodology: Adina Camelia Bleotu, Lyn Tieu, Anton Benz, Gabriela Bîlbîie, Mara Panaitescu, Rudmila Rodica Ivan, and Andreea Nicolae

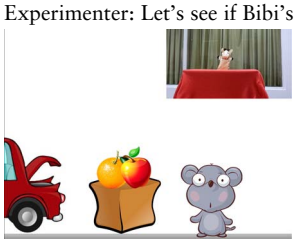
Project administration: Adina Camelia Bleotu, Andreea Nicolae
Visualization: Alexandre Cremers
Writing (original draft): Adina Camelia Bleotu, Andreea Nicolae
Writing (review and editing): Adina Camelia Bleotu, Andreea Nicolae, Lyn Tieu, Alexandre Cremers, Anton Benz, Gabriela Bîlbîie, Mara Panaitescu, Rudmila Rodica Ivan

A Appendix 1

Table A4. Example of a critical item in the 2DT condition in Experiment 1.

Scene 1
Experimenter: Once upon a time there was a little mouse who liked to help his mother with her shopping. One day, his mom bought some fruit: an orange and an apple. Of course, the little mouse wanted to help his mommy with the shopping. Let's see if Bibi can guess what happened next!

Scene 2
Experimenter: Bibi, tell us what happened next.
Bibi: The mouse carried an apple or an orange.
Experimenter: Let's see if Bibi's right!

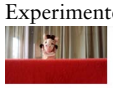


Scene 3
Experimenter: Look, the mouse carried this and this! So was Bibi right?

Table A5. Example of a true practice trial in Experiment 1.

Scene 1
Experimenter: Once upon a time there was a ladybug who liked to paint things.
One day, the ladybug decided to paint things for her friends.
Ladybug prepared all her beautiful paints and brushes.
Then she had to choose what to paint.
Let's see if Bibi can guess what happened next!

Scene 2
Experimenter: Bibi, tell us what happened next.
Bibi: The ladybug painted the mug.
Experimenter: Let's see if Bibi's right!



Scene 3
Experimenter: Look, the ladybug painted the mug! Was Bibi right?
Yes, Bibi guessed that the ladybug was going to paint the mug!
So let's give him a smiley face!

Table A6. Example of a false control item in Experiment 1.

Scene 1
Experimenter: Once upon a time there was a penguin who loved to paint.
One day, the teacher asked him to choose something to paint.
You see, there were fruits, flowers, and a beautiful vase.
Of course the penguin wanted to paint something.
Let's see if Bibi can guess what happened next!

Scene 2
Experimenter: Bibi, tell us what happened next.
Bibi: The penguin painted the fruits or flowers.
Experimenter: Let's see if Bibi was right!

Scene 3
Experimenter: Look, the penguin painted this! Was Bibi right?

B Appendix 2

We ran a Bayesian model on the graded categories determined for each participant by assigning a rate parameter ρ_i to each interpretation i in each of the 16 task×disjunction conditions j. These parameters are defined as the softmax of a linear combination of effects of task, disjunction, and their interaction:

$$\alpha_i^{(j)} = \beta_{0,i} + \beta_{\text{task},i} x_{\text{task}}^{(j)} + \beta_{\text{disj},i} x_{\text{disj}}^{(j)} + \beta_{\text{interaction},i} x_{\text{task}}^{(j)} x_{\text{disj}}^{(j)}$$

$$\rho_i^{(j)} = \frac{\exp(\alpha_i^{(j)})}{\sum_{i'} \exp(\alpha_{i'}^{(j)})}$$

The softmax ensures that $\boldsymbol{\rho}$ sums to one ($\sum_i \rho_i = 1$), while $\boldsymbol{\alpha}^{(j)}$ is only defined up to an additive constant. To avoid identifiability issues, we fix this constant to 0 and define all the β's as sum-to-zero vectors in Stan. If a participant's responses correspond to a vector of rates $\boldsymbol{x}$ after applying the transformation described above, we assign a likelihood proportional to the dot product ($\boldsymbol{\rho} \cdot \boldsymbol{x}$) to this observation. The proportionality constant is $(n+1)!$, where n is the number of categories, and comes from the normalization to obtain a probability distribution when generalizing from discrete categories to graded ones.[28]

In practice, we have three distinct predictors for disjunction and three different interaction terms, since there are four disjunctions in our experiment. The Stan code for the model with weak priors is given in Listing 1. The models with priors informed by previous studies are available in the OSF repository.

When reporting the models, we give the posterior mean and credible interval for $\rho_i^{(j)}$ for $i =$inclusive, exclusive, conjunctive, as well as the posterior probability $P(\rho_i^{(j)} > \rho_{\text{contradictory}}^{(j)})$.

```
data {
    int<lower=0> N; // number of data points, i.e. subjects
    int<lower=1> N_cat; // number of participant categories
    array[N] real task; // task
    array[N] real disj1; // disjunction predictor 1 (marked sau)
    array[N] real disj2; // disjunction predictor 2 (sau sau)
    array[N] real disj3; // disjunction predictor 3 (fie fie)
    array[N] simplex[N_cat] category; // participant category as vector
}

parameters {
    sum_to_zero_vector[N_cat] beta0; // intercept
    sum_to_zero_vector[N_cat] beta_task; // effect of task
    sum_to_zero_vector[N_cat] beta_disj1; // marked sau vs neutral sau
    sum_to_zero_vector[N_cat] beta_inter1; // interaction
    sum_to_zero_vector[N_cat] beta_disj2; // sau sau vs neutral sau
    sum_to_zero_vector[N_cat] beta_inter2; // interaction
    sum_to_zero_vector[N_cat] beta_disj3; // fie fie vs neutral sau
    sum_to_zero_vector[N_cat] beta_inter3; // interaction
}

transformed parameters {
    array[N] real log_lik;
    for (i in 1:N) {
    log_lik[i] = log_sum_exp(
        log_softmax(beta0 + task[i]*beta_task +
        disj1[i]*beta_disj1 + task[i]*disj1[i]*beta_inter1 +
        disj2[i]*beta_disj2 + task[i]*disj2[i]*beta_inter2 +
        disj3[i]*beta_disj3 + task[i]*disj3[i]*beta_inter3) +
        log(category[i])) + lgamma(N_cat+2);

    }
}
```

[28] The case of n discrete categories can be represented by a set of n possible values for $\boldsymbol{x}$ consisting of the vectors $\boldsymbol{\delta}_k$, each with 0's except a single 1 in position k, for $k \in \{1 \dots n\}$. The sum of ($\boldsymbol{\rho} \cdot \boldsymbol{x}$) over this set is 1 if and only if $\sum_k \rho_k = 1$. With graded categories, we want $\int_K P(\boldsymbol{x})d\boldsymbol{x} = 1$ where K is the n-dimension simplex: $K = \{\boldsymbol{x} \in [0,1]^n | \sum_k x_k = 1\}$. We can continue parameterizing this distribution with a simplex vector $\boldsymbol{\rho}$ and have $P(\boldsymbol{x}) \propto \boldsymbol{x} \cdot \boldsymbol{\rho}$, but $\int_K \boldsymbol{x} \cdot \boldsymbol{\rho} d\boldsymbol{x} = \frac{1}{(n+1)!} \neq 1$. Crucially, this constant does not depend on $\boldsymbol{\rho}$ itself, so the only change we need when going from discrete to graded categories is to add a constant $\log(n+1)!$ to the log-likelihood for each data point (technically, this isn't even needed in Stan, which drops normalizing constants for most probability distributions anyway).

```
model {

    beta0 ~ normal(0,2);
    beta_task ~ normal(0,1);
    beta_disj1 ~ normal(0,1);
    beta_inter1 ~ normal(0,.5);
    beta_disj2 ~ normal(0,1);
    beta_inter2 ~ normal(0,.5);
    beta_disj3 ~ normal(0,1);
    beta_inter3 ~ normal(0,.5);

    target += sum(log_lik);
}
```

The model with uninformative priors and only one level for disjunction was run on data from Tieu *et al.* (2017), Huang and Crain (2020), and Skordos *et al.* (2020) to obtain more informative priors for our own study. New priors on each component of the β parameters for adults and children were obtained by extracting the posterior mean and SD for each parameter, and increasing the SD for each effect by a constant 0.2 to reflect the additional

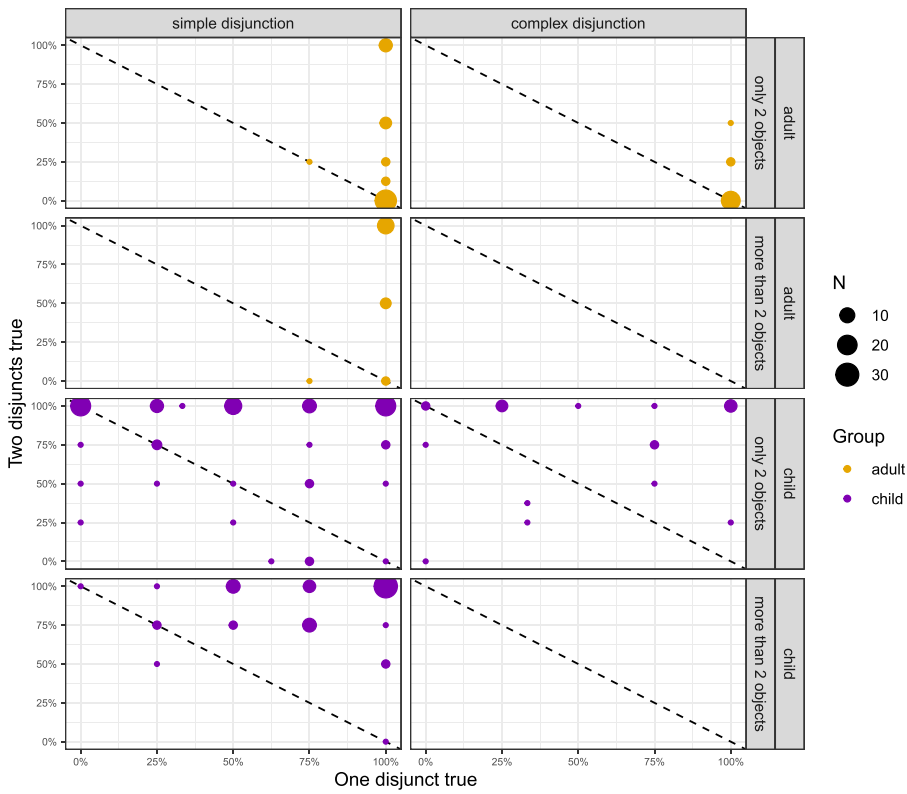


Figure B8. Distribution of participants based on their responses to 1DT and 2DT targets across Tieu *et al.* (2017), Huang and Crain (2020), and Skordos *et al.* (2020). Note that none of these studies tested complex disjunctions with more than 2 objects in the scene, so one quadrant is empty. This data was used to generate priors for the Bayesian analysis of our data.

uncertainty when testing different disjunctions in a new language (these previous studies tested French, Japanese, Mandarin Chinese, and English). Importantly, Tieu *et al.* tested complex disjunctions, while the other studies tested the effect of additional objects in the scene, but no previous study tested complex disjunctions with more items present. This means that this data contains virtually no information on interaction effects, and so the "informed priors" are essentially uninformative for this specific parameter. We treated the neutral *sau* disjunction as a simple disjunction, and all other disjunctions as complex disjunctions. Figure B8 shows the data from all three studies in one graph for comparison with Fig. 6.

References

Aloni, M., Klochowicz, T., and Sbardolini, G. (2024) 'Neglect-zero and no-split: cognitive biases at the semantic-pragmatic interface'. *Presented at the Workshop "Free Choice Inferences: Theoretical and Experimental Approaches"*. University of Bucharest, ZAS Berlin, University of Toronto.

Alonso Ovalle, L. (2006) 'Disjunction in Alternative Semantics', PhD thesis, University of Massachusetts Amherst.

Armstrong, M. (2014) 'Child comprehension of intonationally-encoded disbelief'. In W. Orman and M. J. Valleau (eds), *Proceedings of the 38th Annual Boston University Conference on Language Development*. MA. Cascadilla Press. Somerville. 25–38.

Armstrong, M. (2020) 'Children's epistemic inferences through modal verbs and prosody'. *Journal of Child Language* 47: 1132–69. https://doi.org/10.1017/S0305000919000916.

Bar-Lev, M. E. (2018) 'Free Choice, Homogeneity, and Innocent Inclusion', Doctoral thesis, The Hebrew University of Jerusalem.

Bar-Lev, M. E., and Fox, D. (2020) 'Free choice, simplification, and innocent inclusion'. *Natural Language Semantics* 28: 175–223. https://doi.org/10.1007/s11050-020-09162-y.

Barner, D. and Bachrach, A. (2010) 'Inference and exact numerical representation in early language development'. *Cognitive Psychology* 60: 40–62. https://doi.org/10.1016/j.cogpsych.2009.06.002.

Barner, D., Brooks, N. and Bale, A. (2011) 'Accessing the unsaid: the role of scalar alternatives in children's pragmatic inference'. *Cognition* 118: 84–93. https://doi.org/10.1016/j.cognition.2010.10.010.

Barr, D. J., Levy, R., Scheepers, C., and Tily, H. J. (2013) 'Random effects structure for confirmatory hypothesis testing: keep it maximal'. *Journal of Memory and Language* 68: 255–78. https://doi.org/10.1016/j.jml.2012.11.001.

Bleotu, A. C. (2019) *What Colouring Can Tell Us About the Acquisition of Scalar Items in Child Romanian*. OSF. http://osf.io/bwrvt.

Bleotu, A. C. (2021) 'Deriving scalar implicatures in Romanian 7-and 9-year-olds'. In A. Sevcenco, L. Avram, and V. Tomescu (eds), *L1 Acquisition and L2 Learning: The View From Romance, Chapter 13*, pp. 332–53. Amsterdam: John Benjamins Publishing Company. https://doi.org/10.1075/lald.65.13ble.

Bleotu, A. C., and Roeper, T. (2021a) '"Small big flowers" or "small and big flowers"? Simple is better and Roll-Up is too complex for Romanian 5-year-olds'. In D. Dionne, and L.-A. Vidal Covas (eds), *Proceedings of the 45th Annual Boston University Conference on Language Development*, pp. 66–79. Somerville, MA: Cascadilla Press.

Bleotu, A. C., and Roeper, T. (2021b) 'Roll-up is too complex for Romanian 5-year-olds. Evidence from recursive adjectives'. In P. Farrell (ed.), *Proceedings of the Linguistic Society of America, volume 6*, pp. 133–43. Cascadilla Press.

Bleotu, A. C., Benz, A., and Gotzner, N. (2021) 'Shadow playing with Romanian 5-year-olds: epistemic adverbs are a kind of magic!' *Experiments in Linguistic Meaning* 1: 59–70. https://doi.org/10.3765/elm.1.4866.

Bleotu, A. C., Benz, A., and Gotzner, N. (2022) 'Romanian 5-year-olds derive global but not local implicatures with quantifiers embedded under epistemic adverbs: evidence from a shadow play paradigm'. *Proceedings of Sinn und Bedeutung* 26: 149–64. https://doi.org/10.18148/sub/2022.v26i0.993.

Bleotu, A. C., Ivan, R., Nicolae, A., Bîlbîie, G., Benz, A., Panaitescu, M., and Tieu, L. (2023) 'Not all complex disjunctions are alike: on inclusive and conjunctive interpretations in child Romanian'. *Proceedings of the Annual Conference of the Cognitive Science Society* 45: 3062–9.

Bleotu, A. C., Tieu, L., Bîlbîie, G., Panaitescu, M., Slăvuţeanu, G., Benz, A., and Nicolae, A. C. (2024) 'Investigating the effect of prosodic markedness on the interpretation of simple disjunction in Romanian'. *Isogloss. Open Journal of Romance Linguistics* 10: 1–23. https://doi.org/10.5565/rev/isogloss.384.

Bleotu, A. C., Benz, A., and Gotzner, N. (2025a) 'Reasoning with epistemic adverbs in child Romanian: insights from the shadow play paradigm'. *Language Acquisition* 1–32. https://doi.org/10.1080/10489223.2025.2470770.

Bleotu, A. C., Bîlbîie, G., Panaitescu, M., Cremers, A., Nicolae, A., Benz, A., and Tieu, L. (2025b) 'Does hearing "and" help children understand "or"? Insights into scales and relevance from the acquisition of disjunction in child Romanian'. *Journal of Child Language* 1–34. https://doi.org/10.1017/S0305000925100068. Published online.

Bleotu, A. C., Nicolae, A., Panaitescu, M., Bîlbîie, G., Benz, A., and Tieu, L. (2025c) 'A nonce investigation of a possible conjunctive default for disjunction'. *Experiments in Linguistic Meaning* 3: 53–64. https://doi.org/10.3765/elm.3.5824.

Bleotu, A. C., Panaitescu, M., Benz, A., Nicolae, A., Bîlbîie, G., and Tieu, L. (2025d) 'Coloring disjunction in child Romanian'. *Experiments in Linguistic Meaning* 3: 65–74. https://doi.org/10.3765/elm.3.5822.

Bleotu, A. C., Bîlbîie, G., Nicolae, A. C., Panaitescu, M., Benz, A., and Tieu, L. (2025e) 'The role of incompatible disjuncts in the acquisition of disjunction'. *Proceedings of Sinn Und Bedeutung* 29: 129–43. https://doi.org/10.18148/sub/2025.v29.1198.

Bott, L., and Noveck, I. (2004) 'Some utterances are underinformative: The onset and time course of scalar inferences'. *Journal of Memory and Language* 51: 437–57. https://doi.org/10.1016/j.jml.2004.05.006.

Bowler, M. (2014) 'Conjunction and disjunction in a language without "and"'. *Proceedings of Semantics and Linguistic Theory* 24: 137–55. https://doi.org/10.3765/salt.v24i0.2422v.

Braine, M., and Rumain, B. (1981) 'Children's comprehension of "or": Evidence for a sequence of competencies'. *Journal of Experimental Child Psychology* 31: 46–70. https://doi.org/10.1016/0022-0965(81)90003-5.

Braunwald, S. (1971) 'Mother-child communication: The function of maternal-language input'. *Word* 27: 28–50. https://doi.org/10.1080/00437956.1971.11435613.

Breheny, R., Klinedinst, N., Romoli, J., and Sudo, Y. (2018) 'The symmetry problem: current theories and prospects'. *Natural Language Semantics* 26: 85–110. https://doi.org/10.1007/s11050-017-9141-z.

Brown, R. (1973) *A First Language: The Early Stages*. Harvard University Press.

Buccola, B., Križ, M., and Chemla, E. (2021) *Conceptual Alternatives: Competition in Language and Beyond*. Linguistics & Philosophy. https://doi.org/10.1007/s10988-021-09327-w.

Bürkner, P. (2017) 'brms: An R Package for Bayesian Multilevel Models Using Stan'. *Journal of Statistical Software* 80: 1–28. https://doi.org/10.18637/jss.v080.i01.

Chemla, E. (2008) 'Similarity: towards a unified account of scalar implicatures, free choice permission, and presupposition projection'. Manuscript.

Chemla, E., and Bott, L. (2014) 'Processing inferences at the semantics/pragmatics frontier: disjunctions and free choice'. *Cognition* 130: 380–96. https://doi.org/10.1016/j.cognition.2013.11.013.

Chemla, E., and Singh, R. (2014a) 'Remarks on the experimental turn in the study of scalar implicature, part I'. *Language and Linguistic Compass* 8: 373–86. https://doi.org/10.1111/lnc3.12081.

Chemla, E., and Singh, R. (2014b) 'Remarks on the experimental turn in the study of scalar implicature, part II'. *Language and Linguistic Compass* 8: 387–99. https://doi.org/10.1111/lnc3.12080.

Chierchia, G. (2013) *Logic in Grammar: Polarity, Free Choice, and Intervention*. Oxford University Press.

Chierchia, G., Crain, S., Guasti, M. T., Gualmini, A., and Meroni, L. (2001) 'The acquisition of disjunction: evidence for a grammatical view of scalar implicatures'. In A. H.-J. Do, L. Dominguez, and A. Johansen (eds), *Proceedings of the 25th Boston University Child Language Development Conference*. Cascadilla Press. Somerville, MA. 157–68.

Choi, Y., and Mazuka, R. (2003) 'Young children's use of prosody in sentence parsing'. *Journal of Psycholinguistic Research* 32: 197–217. https://doi.org/10.1023/A:1022400424874.

Clark, E. V. (1973) 'What's in a word? On the child's acquisition of semantics in his first language'. In T. E. Moore (ed.), *Cognitive Development and the Acquisition of Language*. Elsevier. New York. 65–110.

Cotfas, M. A. (2017) 'Temporal specification and subject reference in Romanian subjunctive complements'. *Bucharest Working Papers in Linguistics* 2: 209–23. https://api.semanticscholar.org/CorpusID:204956356.

Crain, S., and Thornton, R. (1998) *Investigations in Universal Grammar: A Guide to Experiments on the Acquisition of Syntax and Semantics*. The MIT Press. https://doi.org/10.7551/mitpress/3948.001.0001.

Crain, S., Ni, W., and Conway, L. (1994) 'Learning, parsing and modularity'. In L. F. Charles Clifton, and K. Rayner (eds), *Perspectives on Sentence Processing*, pp. 443–67. Hillsdale, NJ: Lawrence Erlbaum.

Crain, S., Gardner, A., Gualmini, A., and Rabbin, B. (2002) 'Children's command of negation'. In Y. Otsu (Ed.), *Perspectives on Sentence Processing*, pp. 443–67. Hillsdale, NJ: Lawrence Erlbaum.

Dalrymple, M., Kanazawa, M., Kim, Y., McHombo, S., and Peters, S. (1998) 'Reciprocal expressions and the concept of reciprocity'. *Proceedings of the 3rd Tokyo Conference on Psycholinguistics*, pp. 71–95. Tokyo: Hituzi.

Deal, A. R. (2011) 'Modals without scales'. *Language* 87: 559–85. https://doi.org/10.1353/lan.2011.0060.

Dieuleveut, A., van Dooren, A., Cournane, A., and Hacquard, V. (2022) 'Finding the force: how children discern possibility and necessity modals'. *Natural Language Semantics* 30: 269–310. https://doi.org/10.1007/s11050-022-09196-4.

Farkas, D. (1984) 'Subjunctive complements in Romanian'. In P. Baldi (ed.), *Papers From the 12th Linguistic Symposium on Romance Languages*, pp. 354–72. Amsterdam/Philadelphia: John Benjamins.

Felton, C., and Jasbi, M. (2025) 'Quantifying non-implicature sources of disjunction exclusivity'. *Proceedings of Experiments in Linguistic Meaning ELM 3*: 163–75. https://doi.org/10.3765/elm.3.5806.

Fox, D. (2007) 'Free choice and the theory of scalar implicatures'. In U. Sauerland, and P. Stateva (eds), *Presupposition and Implicature in Compositional Semantics*, pp. 71–120. London: Palgrave Macmillan.

Fox, D., and Katzir, R. (2011) 'On the characterization of alternatives'. *Natural Language Semantics* 19: 87–107. https://doi.org/10.1007/s11050-010-9065-3.

Franke, M. (2011) 'Quantity implicatures, exhaustive interpretation, and rational conversation'. *Semantics and Pragmatics* 4: 1–82. https://doi.org/10.3765/sp.4.1.

Geurts, B. (2005) 'Entertaining alternatives: disjunctions as modals'. *Natural Language Semantics* 13: 383–410. https://doi.org/10.1016/s0010-0277(02)00180-4.

Giorgi, A., and Pianesi, F. (1997) *Tense and Aspect: From Semantics to Morphosyntax*. Oxford: Oxford University Press.

Gotzner, N., Spalek, K., and Wartenburger, I. (2013) 'How pitch accents and focus particles affect the recognition of contextual alternatives'. In M. Knauff, M. Pauen, N. Sebanz, and I. Wachsmuth (eds), *Proceedings of the 35th Annual Meeting of the Cognitive Science Society*, pp. 2434–40. Austin, TX: Cognitive Science Society.

Gotzner, N., Wartenburger, I., and Spalek, K. (2016). The impact of focus particles on the recognition and rejection of contrastive alternatives. *Language and Cognition*, 8:59–95. https://doi.org/10.1017/langcog.2015.25.

Gotzner, N., Barner, D., and Crain, S. (2020) 'Disjunction triggers exhaustivity implicatures in 4- to 5-year-olds: investigating the role of access to alternatives'. *Journal of Semantics* 37: 219–45. https://doi.org/10.1093/jos/ffz021.

Grosz, P. G. (2008) *German Particles, Modality, and the Semantics of Imperatives*. https://api.semanticscholar.org/.

Gualmini, A., Crain, S., Meroni, L., Chierchia, G., and Guasti, M. T. (2001) 'At the semantics/pragmatics interface in child language'. *Proceedings of Semantics and Linguistic Theory* 11: 231–47. https://doi.org/10.3765/salt.v11i0.2840.

Guasti, M. T., Chierchia, G., Crain, S., Foppolo, F., Gualmini, A., and Meroni, L. (2005) 'Why children and adults sometimes (but not always) compute implicatures'. *Language and Cognitive Processes* 20: 667–96. https://doi.org/10.1080/01690960444000250.

Heim, I. (1982) 'The Semantics of Definite and Indefinite Noun Phrases', Phd dissertation, University of Massachusetts. Amherst.

Horn, L. (1972) 'On the semantic properties of logical operators in English', PhD dissertation, University of California. Los Angeles.

Horn, L. R. (1984) 'Towards a new taxonomy of pragmatic inference: Q-based and R-based implicature'. In D. Schiffrin (ed.), *Meaning, Form, and Use in Context: Linguistic Applications*, pp. 11–42. Washington: Georgetown University Press.

van Hout, A. (1998) 'On learning the role of direct objects for telicity in Dutch and English'. *Linguistics* 24. https://scholarworks.umass.edu/umop/vol24/iss1/9.

Huang, H., and Crain, S. (2020) 'When *OR* is assigned a conjunctive inference in child language'. *Language Acquisition* 27: 74–97. https://doi.org/10.1080/10489223.2019.1659273.

Ito, K., Jincho, N., Minai, U., Yamane, N., and Mazuka, R. (2012) 'Intonation facilitates contrast resolution: evidence from Japanese adults and 6-year-olds'. *Journal of Memory and Language* 66: 265–84. https://doi.org/10.1016/j.jml.2011.09.002.

Jasbi, M., Jaggi, A., and Frank, M. C. (2018) 'Conceptual and prosodic cues in child-directed speech can help children learn the meaning of disjunction'. *Cognitive Science*. https://api.semanticscholar.org/CorpusID:46676615.

Jasbi, M., Jaggi, A., Clark, E. V., and Frank, M. C. (2022) 'Context-dependent learning of linguistic disjunction'. *Journal of Child Language*, 1–36. https://doi.org/10.1017/S0305000922000502.

Jeretič, P. (2021) 'Neg-Raising Modals and Scaleless Implicatures', PhD dissertation, New York University.

Katzir, R. (2007) 'Structurally-defined alternatives'. *Linguistics and Philosophy* 30: 669–90. https://doi.org/10.1007/s10988-008-9029-y.

Katzir, R. (2014) 'On the roles of markedness and contradiction in the use of alternatives'. In S. Pistoia-Reda (ed.), *Semantics, Pragmatics and the Case of Scalar Implicatures*, pp. 40–71. London: Palgrave Macmillan. https://doi.org/10.1007/s10988-013-9130-8.

Katzir, R., and Singh, R. (2013) 'Constraints on the lexicalization of logical operators'. *Linguistics and Philosophy* 36: 1–29.

Klochowicz, T., Sbardolini, G., and Aloni, M. (2025) 'Cognitive bias approach to the acquisition of disjunction'. Presented at Sinn und Bedeutung 30, 26 September 2025. Slides available at: https://www.tklochowicz.com/assets/slides/Klochowicz-Sbardolini-Aloni_talk.pdf.

Kratzer, A., and Shimoyama, J. (2002) 'Indeterminate pronouns: the view from Japanese'. In Y. Otsu (ed.), *Proceedings of the Tokyo Conference on Psycholinguistics*, vol. 3. Tokyo. Hituzi Syobo. 1–25.

Leahy, B., and Carey, S. (2020) 'The acquisition of modal concepts'. *Trends in Cognitive Sciences* 24: 65–78. https://doi.org/10.1016/j.tics.2019.11.004.

Leahy, B., and Žalnieriūnas, E. (2021) 'Might and might not: children's conceptual development and the acquisition of modal verbs'. *Proceedings of Semantics and Linguistic Theory* 31: 426–45. https://doi.org/10.3765/salt.v31i0.5082.

Lungu, O., Fălăuş, A., and Panzeri, F. (2021) 'Disjunction in negative contexts: a cross-linguistic experimental study'. *Journal of Semantics* 38: 221–47. https://doi.org/10.1093/jos/ffab002.

Mauri, C. (2008a) 'Coordination relations in the languages of Europe and beyond'. In *Empirical Approaches to Language Typology*, vol. 42. Mouton de Gruyter.

Mauri, C. (2008b) 'The irreality of alternatives'. *Studies in Language* 32: 22–55. https://doi.org/10.1075/sl.32.1.03mau.

Meertens, E., Egger, S., and Romero, M. (2019) 'Multiple accent in alternative questions'. In M. T. Espinal, E. Castroviejo, M. Leonetti, L. McNally, and C. Real-Puigdollers (eds), *Proceedings of Sinn Und Bedeutung*, vol. 23, pp. 179–96. Bellaterra: Universitat Autònoma de Barcelona. https://doi.org/10.18148/sub/2019.v23i2.605.

Nicolae, A., and Sauerland, U. (2016) 'A contest of strength: *or* versus *either–or*'. In P. B. Nadine Bade, and A. Schöller (eds), *Proceedings of Sinn Und Bedeutung*, vol. 20, pp. 551–68. Open Journal Systems. https://ojs.ub.uni-konstanz.de/sub/index.php/sub/article/view/280.

Nicolae, A. C., Petrenco, A., Tsilia, A., and Marty, P. (2024) 'Do languages have exclusive disjunctions?' *Open Mind* 8: 1469–85. https://doi.org/10.1162/opmia00175.

Nicolae, A. C., Petrenco, A., Tsilia, A., and Marty, P. (2025) 'Exclusivity and exhaustivity of disjunction(s): a cross-linguistic study. In *et al*., B., editor'. *Proceedings of Sinn und Bedeutung* 28: 1098–113. https://doi.org/10.18148/sub/2024.v28.1184.

Notley, A., Thornton, R., and Crain, S. (2012) 'English-speaking children's interpretation of disjunction in the scope of 'not every''. *Biolinguistics* 6: 32–69. https://doi.org/10.5964/bioling.8883.

Noveck, I. (2001) 'When children are more logical than adults: experimental investigations of scalar implicature'. *Cognition* 78: 165–88. https://doi.org/10.1016/S0010-0277(00)00114-1.

Noveck, I., Ho, S., and Sera, M. (1996) 'Children's understanding of epistemic modals'. *Journal of Child Language* 23: 621–43. https://doi.org/10.1017/S0305000900008977.

Oikonomou, D. (2016) 'Covert Modals in Root Contexts', PhD dissertation, Massachussets Institute of Technology.

Ozturk, O., and Papafragou, A. (2015) 'The acquisition of epistemic modality: from semantic meaning to pragmatic interpretation'. *Language Learning and Development* 11: 191–214. https://doi.org/10.1080/15475441.2014.905169.

Papafragou, A., and Tantalou, N. (2004) 'Children's computation of implicatures'. *Language Acquisition* 12: 71–82. https://doi.org/10.1207/s15327817la12013.
Paris, S. (1973) 'Comprehension of language connectives and propositional logical relationships'. *Journal of Experimental Child Psychology* 16: 278–91. https://doi.org/10.1016/0022-0965(73)90167-7.
Pouscoulous, N., Noveck, I., Politzer, G., and Bastide, A. (2007) 'A developmental investigation of processing costs in implicature production'. *Language Acquisition* 14: 347–75. https://doi.org/10.1080/10489220701600457.
Quer, J. (1998) 'Mood at the Interface', PhD dissertation, Utrecht University.
Reilly, J. S. (1982) 'The Acquisition of Conditionals in English', PhD dissertation, Los Angeles, University of California.
Roeper, T. (2011) 'The acquisition of recursion: how formalism articulates the child's path'. *Biolinguistics* 5: 57–86. https://doi.org/10.5964/bioling.8831.
van Rooij, R. (2010) 'Conjunctive interpretation of disjunction'. *Semantics and Pragmatics* 3. https://doi.org/10.3765/sp.3.11.
Sauerland, U. (2004) 'Scalar implicatures in complex sentences'. *Linguistics and Philosophy* 27: 367–91. https://doi.org/10.1023/B:LING.0000023378.71748.db.
Sauerland, U., and Yatsushiro, K. (2018) 'The acquisition of disjunctions: evidence from German children'. *Proceedings of Sinn und Bedeutung 21* 2: 1065–72. https://ojs.ub.uni-konstanz.de/sub/index.php/sub/article/view/184.
Sauerland, U., Tamura, A., Koizumi, M., and Tomlinson, J. M. (2017) 'Tracking down disjunction'. In M. Otake, S. Kurahashi, Y. Ota, K. Satoh, and D. Bekki (eds), *New Frontiers in Artificial Intelligence. JSAI-isAI 2015, volume 10091 of Lecture Notes in Computer Science*, pp. 97–111. Cham: Springer. https://doi.org/10.1007/978-3-319-50953-29.
Schwager, M. (2006) 'Interpreting Imperatives', PhD dissertation, Frankfurt University.
Sekerina, I. A., and Trueswell, J. C. (2012) 'Interactive processing of contrastive expression by Russian children'. *First Language* 32: 63–87. https://doi.org/10.1177/0142723711403981.
Singh, R. (2025) 'Monotonicity, substitution sources, and the robustness of disjunct alternatives'. In N. Gotzner, J. A. Harris, R. Breheny, and Y. Sharvit (eds), *Alternatives in Grammar and Cognition, Palgrave Studies in Pragmatics, Language and Cognition*. Cham: Palgrave Macmillan. https://doi.org/10.1007/978-3-031-76676-39.
Singh, R., Wexler, K., Astle-Rahim, A., Kamawar, D., and Fox, D. (2016) 'Children interpret disjunction as conjunction: consequences for theories of implicature and child development'. *Natural Language Semantics* 24: 305–52. https://doi.org/10.1007/s11050-016-9126-3.
Skordos, D., Feiman, R., Bale, A. C., and Barner, D. (2020) 'Do children interpret 'or' conjunctively?' *Journal of Semantics* 37: 247–67. https://doi.org/10.1093/jos/ffz022.
Slobin, D. I. (1973) 'Cognitive prerequisites for the development of grammar'. In C. A. Ferguson, and D. I. Slobin (eds), *Studies in Child Language Development*, vol. 3, pp. 175–208. New York: Holt, Rineheart, Winston.
Snedeker, J., and Yuan, S. (2008) 'Effects of prosodic and lexical constraints on parsing in young children (and adults)'. *Journal of Memory and Language* 58: 574–608. https://doi.org/10.1016/j.jml.2007.08.001.
Spector, B. (2014) 'Global positive polarity items and obligatory exhaustivity'. *Semantics and Pragmatics* 7: 1–61. https://doi.org/10.3765/sp.7.11.
Stoicescu, I., Sevcenco, A., and Avram, L. (2015) 'The acquisition of scalar implicatures in child Romanian'. In M. Burada, and O. Tatu (eds), *Proceedings of the 11th Conference on British and American Studies*. Cambridge Scholars Publishing. Newcastle upon Tyne. 141–55.
Su, Y. E. (2014) 'The acquisition of logical connectives in Child Mandarin'. *Language Acquisition* 21: 119–55. https://doi.org/10.1080/10489223.2014.884568.
Szabolcsi, A. (2015) 'What do quantifier particles do?' *Linguistics and Philosophy* 38: 159–204. https://doi.org/10.1007/s10988-015-9166-z.
Szendrői, K., Bernard, C., Berger, F., Gervain, J., and Höhle, B. (2018) 'Acquisition of prosodic focus marking by English, French, and German three-, four-, five- and six-year-olds'. *Journal of Child Language* 45: 219–41. https://doi.org/10.1017/S0305000917000071.
Tieu, L., Romoli, J., Zhou, P., and Crain, S. (2016) 'Children's knowledge of free choice inferences and scalar implicatures'. *Journal of Semantics* 33: 269–98. https://doi.org/10.1093/jos/ffv001.

Tieu, L., Yatsushiro, K., Cremers, A., Romoli, J., Sauerland, U., and Chemla, E. (2017) 'On the role of alternatives in the acquisition of simple and complex disjunctions in French and Japanese'. *Journal of Semantics* 34: 127–52. https://doi.org/10.1093/jos/ffw010.

Tulling, M. A., and Cournane, A. (2022) 'Wishes before ifs: mapping "fake" past tense to counterfactuality in wishes and conditionals'. *Language Development Research* 2: 306–55. https://doi.org/10.34842/2022.0559.

Uegaki, W. (2024) 'The informativeness/complexity trade-off in the domain of boolean connectives'. *Linguistic Inquiry* 55: 174–96. https://doi.org/10.1162/ling_a_00461.

Winter, Y. (1995) 'Syncategorematic conjunction and structured meanings'. In M. Simons, and T. Galloway (eds), *Proceedings of Semantics and Linguistic Theory 5*, 387–404. Ithaca, NY: CLC Publications, Cornell University. https://doi.org/10.3765/salt.v5i0.2704.

Yatsushiro, K., Sugawara, A., and Sauerland, U. (2019) 'Quantifier scope and intonation in German'. In M. M. Brown, and B. Dailey (eds), *Proceedings of the 43rd Boston University Conference on Language Development*, pp. 730–43. Somerville: MA. Cascadilla Press.

Zhou, P., Romoli, J., and Crain, S. (2013) 'Children's knowledge of free choice inferences'. In T. Snider (ed.), *Proceedings of Semantics and Linguistic Theory 23*, pp. 632–51. Cornell University Ithaca. NY. CLC Publications. https://doi.org/10.3765/salt.v23i0.2657.

Zimmermann, T. E. (2000) 'Free choice disjunction and epistemic possibility'. *Natural Language and Semantics* 8: 255–90. https://doi.org/10.1023/A:1011255819284.

Journal of Semantics, 2025, 00, 1–42
https://doi.org/10.1093/jos/ffaf011
Article