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## ARTICLE

# Does hearing "and" help children understand "or"? Insights into scales and relevance from the acquisition of disjunction in child Romanian

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## Abstract
Children are known to derive more implicatures when the required alternative is made salient through contrast or when it is made contextually relevant through a story or a Question Under Discussion. We investigated the exclusivity implicature of three disjunctions (*sau* "or", *sau… sau*, and *fie…fie* "either…or") in child Romanian, an understudied language in the previous literature. Three experiments reveal that the mere presence of the stronger alternative, that is, simply hearing unrelated conjunctive statements in the course of the experiment, is not enough to boost implicatures. Rather, implicatures increase as a result of both access to alternatives and contextual relevance (expressed through conjunctive questions such as *Did the hen push the train and the boat?*). Interestingly, the boost in implicatures was observed only for *sau*-based disjunctions, not for *fie…fie*, which we conjecture may be due to children treating the latter as ambiguous between disjunction and conjunction.

**Keywords:** disjunction; implicatures; relevance; alternatives; experimental pragmatics

## Rezumat
Copiii sunt cunoscuţi pentru faptul că derivă mai multe implicaturi atunci când alternativa unei propoziţii este evidenţiată prin contrast sau făcută relevantă contextual printr-o poveste sau o întrebare la obiect. În acest studiu, am investigat implicatura de exclusivitate cu trei disjuncţii diferite (*sau, sau…sau, fie…fie*) la copii, într-o limbă puţin explorată anterior: limba română. Rezultatele a trei experimente arată că simpla prezenţă a alternativei mai puternice – adică simpla ascultare a unor propoziţii conjunctive, fără legătură directă cu propoziţiile disjunctive – nu este suficientă pentru a duce la o creştere a ratei de implicaturi.

În schimb, implicaturile cresc atunci când alternativele devin accesibile și relevante contextual (de exemplu, prin întrebări conjunctive precum *A împins găina trenul și barca?*). Interesant este că acest efect se manifestă doar pentru disjuncțiile bazate pe *sau*, nu și pentru *fie…fie*, care este tratată de copii ca ambiguă între disjuncție și conjuncție.

## 1. Aim

The current paper experimentally investigates the interpretation of disjunctive utterances such as (1) in child and adult Romanian, focusing on what factors may lead children to interpret the utterance more exclusively (as *The hen pushed one but not both*), and, thus, in a more adult-like manner.

(1)  Găina      a      împins   **sau**   trenul   **sau**   barca.
     hen.DEF   has   pushed   or        train.DEF   or       boat.DEF
     "The hen pushed either the train or the boat."

It is well known in the literature on disjunction in child language (Paris, 1973; Sauerland & Yatushiro, 2018; Singh et al., 2016; Tieu et al., 2017) that, unlike adults, who tend to be exclusive in their interpretation of disjunction, children tend to have a wider array of interpretations: they can interpret disjunction inclusively (as *The hen pushed the train or the boat, possibly both*), conjunctively (as *The hen pushed the train and the boat*), and only sometimes exclusively (as *The hen pushed the train or the boat, but not both*). Interestingly, it seems to make no difference for children if the disjunction is simple (*or*) or complex (*either…or*) (Tieu et al., 2017), whereas for adults, complex disjunctions are typically associated with an exclusive interpretation more so than simple disjunctions (Nicolae et al., 2024, 2025; Nicolae & Sauerland, 2016; Spector, 2014; Szabolcsi, 2015).

Previous studies on quantifiers suggest that, while children have difficulty drawing scalar implicatures with utterances containing the weak scalar term *some*, such as (2a), they perform better once they have access to the stronger alternative (i.e., containing the stronger term *all*, for instance, as in (2b)) or the utterance they have to evaluate is made contextually relevant in some way, for example, through a question such as (2c) or a story (see Chierchia et al., 2001; Degen, 2013; Foppolo et al., 2012; Guasti et al., 2005; Skordos & Papafragou, 2016).

(2)  (a)   Some hens are charming.
     (b)   All hens are charming.
     (c)   Are all hens charming?

Skordos and Papafragou (2016) investigated the role of access to alternatives and relevance for implicatures with the quantifier *some* in children. They found that the presence of alternatives containing *all*, intermixed with sentences containing *some*, significantly boosted implicature rates compared to a condition where sentences with *all* were always presented after those with *some*. Interestingly, however, in a follow-up experiment, they showed that if the *all* alternative was present, but clearly not relevant, as enforced through a Question Under Discussion (QUD) involving non-quantity-related considerations, the implicature rates went back down as in the condition where *all* was

presented after *some*. Skordos and Papafragou (2016) used such evidence to conclude that relevance plays a much more important role than mere access to alternatives. In the present study, we address similar questions for disjunction in child Romanian. In particular, we ask whether Romanian-speaking children are more prone to interpret disjunction exclusively, drawing the implicature from (1) that *It is false that the hen pushed the train and the boat*, in two situations: (i) when a stronger conjunctive utterance is mentioned explicitly, for an unrelated situation, as in (3), and (ii) when a stronger conjunctive alternative is made contextually relevant through an explicit question introducing the QUD, as in (4). Given the results reported in Skordos and Papafragou (2016), and assuming that the derivation of implicatures associated with disjunction involves similar steps to the derivation of implicatures with quantifiers, we hypothesise that contextual relevance via the presence of a QUD should result in higher implicature rates.

(3)  Căprioara  a    ales    o prăjitură  şi   o salată.
     deer.DEF   has  chosen  a cake       and  a salad
     "The deer chose a cake and a salad."

(4)  (a)  A împins găina trenul **şi** barca?
          "Did the hen push the train and the boat?"
     (b)  Găina a împins **sau** trenul **sau** barca.
          "The hen pushed either the train or the boat."

This paper is structured as follows: In Section 2, we present the relevant background on disjunction and implicatures in child language, discussing factors that have been found to increase rates of implicature. In Section 3, we motivate the study of disjunction in child Romanian. Section 4 presents a set of three experiments conducted with Romanian-speaking children and adults. We discuss our main findings in Section 5 and conclude in Section 6.

## 2. Background on scalar implicatures: The case of disjunction in child language

### 2.1. On scalar implicatures in adult and child language

In communication, participants often rely on inferences. Consider, for instance, the example in (5), where the sentence uttered by B is interpreted as in (6), an assumption inferentially derived based on what the speaker said. While *some* is generally argued to mean "some and possibly all", in (5), its meaning becomes enriched – strengthened to "not all". This additional meaning is not part of what the speaker has said, yet it arises in communication due to the hearer's ability to go beyond what is said and derive the intended meaning. In fact, the strengthening of *some* to "not all" is so pervasive that participants tend to do it even with sentences that are logically true such as (7), thus ending up rejecting these sentences as false 60% of the time (Bott & Noveck, 2004).

(5)  A: Are **all** koalas asleep?
     B: **Some** koalas are asleep.

(6)  Not all koalas are asleep.

(7)  Some elephants are mammals.

Similarly to the sentence containing *some*, the sentence containing the disjunction marker *or* in (8) is also interpreted as giving rise to the strengthened meaning in (9), an additional meaning that is also arrived at via an inference.

(8)   A: Did the koala receive an apple **and** a pear?
      B: The koala received an apple **or** a pear.

(9)   The koala did not receive both an apple and a pear.

A common assumption since Grice (1975) is that the basic meaning of *some* is "some, possibly all" and that the strengthened "some, but not all" interpretation is derived from the basic one via an implicature; similarly, the basic meaning of *or* is "or, possibly and," and the strengthened "or, but not and" interpretation is derived from the basic one via an implicature. Implicatures are inferences that we draw in conversation, arising from the apparent non-observance of certain maxims of communication (Grice, 1975, 1989). Interlocutors are typically expected to provide truthful, informative, relevant, and appropriately phrased contributions, "to make their conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which they are engaged" (Grice 1975, p. 45). However, in certain cases, speakers appear to flout certain maxims, expecting their hearers to figure out the intended meaning themselves. In the case of scalar implicatures, according to Grice (1975, 1989) and neo-Griceans (e.g., Gazdar, 1979; Horn, 1972), speakers flout the Maxim of Quantity, in particular the submaxim presented in (10).

(10)   Make your contribution as informative as is required.

Scales (also called Horn scales) order items in terms of informational strength, such that for the scales ⟨*all, some*⟩ or ⟨*and, or*⟩,[1] a sentence containing *all* entails a sentence containing *some* but not vice versa, and a sentence containing *and* entails a sentence containing *or* but not the other way around. When a speaker utters a weak term such as *some* or *or*, this means that they have chosen not to articulate the stronger, more informative alternatives *all* and *and*. This may happen either because the speaker is ignorant about whether *all/and* can be used or knows that it cannot.

While strengthened meanings of the type "some, not all" and "or, not and" are often explained pragmatically by means of implicatures, there are multiple possible accounts in the literature (pragmatic, lexical, and grammatical). Even pragmatic theories do not fully agree on how implicatures are generated. According to Gricean and Neo-Gricean pragmatic theories (e.g., Horn, 1972; Levinson, 1983, 2000), scalar implicatures are generated automatically for certain lexical items and independently of context. In contrast, according to Relevance Theory (Carston, 1988; Sperber & Wilson, 1995), scalar implicatures are derived only when the context makes them relevant. This latter view is supported by findings from Bott and Noveck (2004), showing that participants are less accurate and take longer to answer correctly in case of a "some but not all" interpretation rather than of a "some and possibly all" interpretation. According to Lexical Theories (Chierchia, 2004; Levinson, 2000), scalar terms have two meanings: a weak meaning and a

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[1]Other scales involve numerals (⟨*two, one*⟩), modals (⟨*necessarily, possibly*⟩ and ⟨*must, may*⟩), adverbs (⟨*always, often, sometimes*⟩), degree adjectives (⟨*hot, warm*⟩), epistemic verbs (⟨*know, believe*⟩), affective verbs (⟨*love, like*⟩), and verbs of completion (⟨*start, finish*⟩).

strong meaning. Interestingly, according to these approaches, the strong implicature meaning is stored in the lexicon, and the weak meaning is derived by means of implicature cancellation. Finally, grammatical theories (Chierchia, 2006; Fox, 2007) argue that implicatures are derived by inserting a silent exhaustification operator *EXH. EXH(P)* asserts the meaning of P and negates the stronger alternatives of P, as below.

(11)   EXH(The hen pushed the train or the boat)
       = NOT (The hen pushed both the train and the boat)

There is an ongoing debate about which of these theories best accounts for implicature derivation, with no clear consensus having been reached (Sauerland, 2012).

As far as implicatures in child language are concerned, the literature seems to suggest that children struggle with implicatures at an early stage, preferring the weak logical meaning of scalar terms ("some, possibly all" and "or, possibly and") over the strong one. Noveck (2001) was the first to conduct a systematic investigation of the development of scalar implicatures with quantifiers and modals like *x might be y* by means of the Truth Value Judgement Task (TVJT). His experiments suggest that French- and English-speaking children tend to be more logical than adults. Papafragou and Musolino (2003) also found that, in a regular TVJT, Greek children were only adult-like with numerical scales but not with the scales ⟨*all, some*⟩ and ⟨*finish, start*⟩. Similar findings were uncovered for Romanian by Stoicescu et al. (2015), Bleotu et al. (2021a), and Bleotu et al. (2025a): young children struggle with implicatures but gradually become more adult-like as they get older (between ages 7 and 9); nevertheless, they are more adult-like with cardinals from earlier on (Bleotu, 2021).

Children's challenges with scalar implicatures have received multiple accounts in the literature (pragmatic, lexical, grammatical, and processing). According to Neo-Gricean pragmatic accounts (Horn, 1972; Levinson, 1983, 2000), children may experience pragmatic delay, that is, they simply lack certain pragmatic abilities enabling them to derive implicatures, and they are more logical at this stage.

According to Relevance Theory (Carston, 1988; Sperber & Wilson, 1995), children's lower rates of implicatures compared to adults have to do with difficulties in accessing the strong scalar alternatives. Importantly, the prediction is that in a context where the stronger alternative is made relevant, children should derive implicatures. According to Lexical Theories (Chierchia, 2004; Levinson, 2000), children know the meaning of *some/or*; they have just not yet associated the lexical entry with the scale ⟨*all, some*⟩/⟨*and, or*⟩ (Guasti et al., 2005). According to Grammatical Theories (Chierchia, 2006; Fox, 2007), implicatures are derived through a covert exhaustivity operator, *EXH* (equivalent to silent *only*), which affirms a proposition and excludes its stronger alternatives. Children are not adult-like in their construction of the set of alternatives they can exhaustify over. Nevertheless, they seem to be able to employ *EXH*, given the fact that they fail to derive implicatures with *only some* but do not fail with *only the cat and the dog* (Barner et al., 2011). Additionally, according to a Processing Theory, children's difficulty with implicatures may also be related to task processing demands, such as the presence of distractors in the visual context, the use of tasks that impose additional difficulties on children (e.g., the TVJT), and the failure to contextualise utterances. Once task demands are simplified, children seem to perform in a more adult-like manner (Guasti et al., 2005; Pouscoulous et al., 2007).

In addition to the theories of implicature above, various recent studies have proposed an Alternatives-Based Account, according to which children's difficulties with implicatures stem from their inability to access the lexical alternatives required to compute the relevant

implicatures. Once the stronger alternative is made available, children seem to perform in a more adult-like manner (Barner et al., 2011; Bill et al., 2021; Chierchia et al., 2001; Pagliarini et al., 2018; Singh et al., 2016; Tieu et al., 2016). Note that multiple variants of the Alternatives-Based Account are possible, which may place children's difficulty with alternatives in different domains – pragmatic, lexical, and grammatical.

However, while children are generally assumed not to derive implicatures to the same extent as adults, it bears mentioning that this is a matter of empirical debate, as there appears to be significant variation in implicature rates across different tasks, with children deriving more implicatures in tasks that involve a higher level of engagement compared to TVJTs. Binary TVJTs tend to be more challenging for children, whereas more interactive tasks – such as giving rewards, moving objects, or colouring and erasing – often result in higher implicature rates.

Reward tasks have been found to boost implicatures. In their study, Papafragou and Tantalou (2004) used a reward task in which children had to reward an animal for how well it had described its own actions. For example, an animal had to colour *the stars* (four in number); it coloured all of them and then reported this as *I coloured some*. Children were found to perform in a rather adult-like manner: they computed scalar implicatures and refused to reward the elephant with a prize in such cases. In another reward task conducted by Katsos and Bishop (2011), children were asked to offer a "small", "big", or "huge" strawberry as a reward to Mr. Caveman, depending on how good the speaker's responses were. Children rewarded fully informative responses by giving the speaker "huge" strawberries, underinformative ones by giving "big" strawberries, and false responses by giving "small" strawberries. Their responses indicated sensitivity to underinformativeness, previously obscured in binary tasks. Children have also been found to be more adult-like in act-out tasks. Pouscoulous et al. (2007) conducted an act-out task targeting implicatures with the existential quantifiers *quelques* "some$_1$" and *certains* "some$_2$" in French, where a puppet utters *I would like some boxes to contain a token* when the scenario displays each of five boxes already containing a token. If participants take *some* to be compatible with *all*, then they should leave the boxes unchanged; otherwise, they should remove at least one token. The task increased implicature production with *quelques* "some$_1$" for children of various ages (4, 5, and 7). In an act-out task (a colouring task) conducted by Bleotu (2019, 2024) in Romanian, children have also been found to perform in an adult-like manner (see also Bleotu et al., 2025d, for a recent extension of this method to disjunction). Felicity judgement tasks, where children have to choose between a weak scalar sentence (containing *some* or *or*) and a strong scalar sentence (containing *all* or *and*), have also been shown to lead to more adult-like behaviour (Chierchia et al., 2001; Foppolo et al., 2012). Additionally, situating the utterances children have to evaluate in a story context also seems to boost implicature rates (Guasti et al., 2005; Papafragou & Musolino, 2003).

The increase in implicatures could be due to a generally higher level of engagement with all the above-mentioned tasks in a more concrete way than with TVJTs. It could also be due to more contextual relevance (in the act-out, reward, and story-based tasks), as well as access to stronger alternatives and contrast (in felicity judgement tasks). In the next subsection, we focus on contextual relevance and alternatives, drawing on further evidence from the literature and considering its theoretical implications.

## 2.2. On the role of contextual relevance and alternatives

*On the role of relevance*: Relevance has been argued to impact the derivation of pragmatic inferences. As remarked by Papafragou and Musolino (2003), "if preschoolers, unlike

adults, cannot readily infer the pragmatic nature of the task, and are not given adequate motivation to go beyond the truth-conditional content of the utterance, they may readily settle for a statement which is true but does not satisfy the adult expectations of relevance and informativeness" (p. 269). We shall refer to this account as the Relevance-Based Account.

Both adults and children have been found to derive more implicatures in a context that makes the strengthened meaning more relevant (Bleotu et al., 2022b; Degen, 2013; Guasti et al., 2005; Ronai & Xiang 2021a, b; Skordos & Papafragou, 2016; Yang et al., 2018; Zondervan et al., 2008).

Contextual relevance has typically been manipulated either (i) through a background story or (ii) through a question.

Stories that focus on the *quantity* of the participants or objects in the story have been found to boost implicatures. For instance, in Guasti et al. (2005), children were adult-like, deriving implicatures at a rate of 75%. In one story, there were five soldiers who had to go collect a treasure somewhere far away, and they could either go by motorbike or ride a horse. The soldiers started to discuss among themselves: some soldiers said they would go by motorbikes, which are fast, while other soldiers argued that they would ride a horse, which would be less expensive. After this discussion, they all decided to ride horses. Carolina, a puppet, was then asked to say what was happening in the story. Carolina's utterance was *Some soldiers are riding a horse.* Children then had to say whether what Carolina had said was "right" or "wrong". Similarly to adults, children rejected Carolina's underinformative utterances, deriving implicatures.

In another important experimental study, which served as a source of inspiration for our current investigation of disjunction, Skordos and Papafragou (2016) probed the role of relevance and alternatives in children's derivation of implicatures associated with the quantifier *some*. In their first experiment, similarly to Foppolo et al. (2012), they exposed children to utterances where *all* was used in both true and false contexts and to utterances where the use of *some* was either pragmatically appropriate or not. These utterances were presented in various orders, for example, a *Mixed* order, where *some* and *all* trials were intermixed in a pseudorandomised order, making the stronger lexical scale member *all* highly accessible during the evaluation of *some* statements, and a *Some-First* order, where the utterances with *some* preceded those containing *all*, thus making the stronger lexical scale member unavailable to children prior to evaluating *some.* Skordos and Papafragou (2016) found that children derived more implicatures in the *Mixed* order than in the *Some-First* order, a finding suggesting that access to stronger alternatives is important for implicature derivation.

Their second experiment revealed, however, that what affects the rate of implicature calculation is actually whether the alternative is made relevant in the context. The second experiment tested children's interpretation of utterances such as *Some of the blickets have a scarf* in two conditions: a Quantity condition, where participants were guided through linguistic and visual cues to pay attention to whether all or some of the creatures had a scarf (the implicit QUD was *Do all or only some of the blickets have a crayon?*), and an Object condition, where they were encouraged to pay attention to the kinds of objects the blickets had (the implicit QUD was *Do the blickets have a crayon or another object?*). For example, in the Quantity condition, *All of the blickets have a scarf* would be false because three out of four blickets would have a scarf, but in the Object condition, it would be false because all four blickets would have a shovel. The results revealed that children derived more implicatures from potentially underinformative utterances containing *some* in the Quantity condition, which made the contrast between *some* and *all* relevant in the

context. This suggests that alternatives matter for implicature derivation, but only in a context that makes them relevant.

In a third experiment, Skordos and Papafragou went one step further, exposing children to utterances containing *none* or *all* prior to utterances containing *some*. Interestingly, children derived implicatures at a similar rate in both the *None-First* and the *All-First* conditions. This finding led Skordos and Papafragou (2016) to argue that explicitly providing stronger alternatives is not necessary, as long as the context makes them relevant.

Contextual relevance can also be manipulated through questions, a manipulation motivated by the idea that, ultimately, any sentence is to be understood as an answer to a question that introduces the QUD (Gualmini et al., 2008; Hulsey et al., 2004). This idea has been formulated as the Question–Answer Requirement (Hulsey et al., 2004):

(12)   The Question–Answer Requirement (QAR)
       The selected interpretation of an ambiguous sentence, whether true or false, is required to be a good answer to the Question Under Discussion. (A good answer is an interpretation that at least entails an answer to the QUD.)

To give some concrete examples, adults have been shown to derive more implicatures with single-scale utterances that represent answers to explicit questions, such as those in (13) and (14) (Ronai & Xiang 2021a, b), particularly if the question contains a strong scalar term, such as *excellent* in (13) or *all* in (14).

(13)   Sue: *Is the movie excellent?*
       Mary: *It is good.*
       Would you conclude from this that Mary thinks the movie is not excellent? Yes/No
       (Ronai & Xiang, 2021a)

(14)   *Wh*-word: *What colour are the shapes?*
       Indefinite: *Are there any blue shapes?/Are any shapes blue?*
       Quantifier: *Are all shapes blue?*
       *Some shapes are blue*. (Ronai & Xiang, 2021b)

Additionally, Bleotu and Benz (2024) recently investigated adults' derivation of embedded implicatures, which arise when an utterance contains more than one scalar term. For instance, an utterance such as *Some meals are adequate* contains weak terms from two different scales: ⟨all, some⟩ and ⟨good, adequate⟩. Bleotu and Benz (2024) found that adults tended to derive more implicatures from the weak scalar term that appeared in the second/embedded position (i.e., deriving *Some meals are adequate and not good*) when the QUD included the weak term of the first scale (e.g., *some*) and the strong term of the second (embedded) scale (e.g., *good*), as in (15), compared to when there was no such QUD.

(15)   Sue: *Are some meals good?*
       Mary: *Some meals are adequate.* (Bleotu & Benz, 2024)

Building on Bleotu et al. (2021b, 2022a) and Bleotu et al. (2021a), which was further developed into Bleotu et al. (2025a), Bleotu et al. (2022b) employed a Shadow Play Paradigm (Figure 1) to test the influence of a scalar question introducing a QUD upon Romanian adults' and children's interpretation of utterances such as those in (16), embedding a scalar
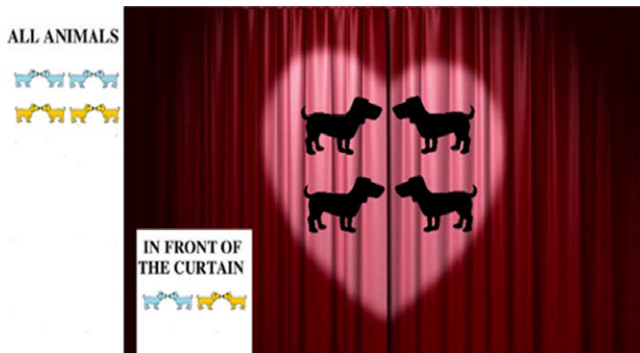
**Figure 1.** Example picture from Bleotu et al. (2022b).

term belonging to the scale ⟨*all, some*⟩ under a scalar term belonging to the scale ⟨*certain, possible*⟩. Participants saw eight dogs enter the game, four of which remained in front, while the silhouettes of four others could be seen hidden behind a curtain. Participants had to infer the identity of these silhouettes based on an utterance they heard (16) and visual cues (the dogs that are in front of the curtain).

(16)     Poate    că    unii    câini    sunt    albaştri.
         maybe    that    some    dogs    are      blue
         "It is possible that some dogs are blue."

Bleotu et al. (2022b) conducted two experiments: Experiment 1, where the question involved the ⟨*certain, possible*⟩ scale, and Experiment 2, where the question involved the ⟨*all, some*⟩ scale (see (17)).

(17)    (a)    ⟨*certain, possible*⟩ QUD
               The wizard asks: *Is it possible or certain that there are blue dogs in the spotlight?*
        (b)    ⟨*all, some*⟩ QUD
               The wizard asks: *Are some or all of the dogs in the spotlight blue?*

Romanian children and adults were both found to derive more global implicatures of the type *It is not certain that some dogs are blue* (GI $_{NotCertainSome}$) in the ⟨*certain, possible*⟩ QUD experiment than in the ⟨*all, some*⟩ QUD one. Thus, contextual manipulations seem to matter for implicature derivation both for adults and children.

*On the role of access to alternatives*: One possible explanation for children's challenges with implicatures could have to do with the failure to retrieve the stronger scalar mate from the lexicon (Barner et al., 2011; Chierchia et al., 2001; Singh et al., 2016; Tieu et al., 2016). When encountering *some* or *or*, children could simply fail to retrieve *all* or *and* from the lexicon. Once these alternatives are made accessible, children's implicature rates are expected to increase. We shall refer to this explanation as the Alternatives-Based

Account, an account compatible with multiple explanations for the source of implicatures (pragmatic, lexical, or grammatical).

In this vein, Chierchia et al. (2001) conducted a Felicity Judgement Task in which children heard both *or* and *and* descriptions of the same contexts. For instance, children were told a story about some farmers who were cleaning their animals. After looking at all of the animals, each farmer decided to clean a horse and/or a rabbit. At this point, the two puppets provided an alternative description of the story (see (18)).

(18)  (a)  Every farmer cleaned a horse **or** a rabbit.
      (b)  Every farmer cleaned a horse **and** a rabbit.

Interestingly, children were 93.3% accurate, choosing the utterance containing *and* in situations where every farmer cleaned both a horse and a rabbit and the utterance containing *or* in situations where every farmer cleaned only one animal. This result shows us that, when given two utterances in contrast, children are able to identify the most informative one. However, it does not alone provide evidence that children have the ability to derive scalar implicatures, a more complex process that additionally involves the participants' understanding that *some* conveys the meaning *not all*.

The idea that children struggle with implicatures because they have a hard time retrieving the stronger scale mates from the lexicon is also supported by the work of Barner et al. (2011). They provide experimental evidence that children are able to derive implicatures when *only* modifies lexical Determiner Phrases (DPs), but they find it much harder to do so when *only* modifies *some* (see (19)).

(19)  (a)  Only the cat and the dog are sleeping.
      (b)  Only some of the animals are sleeping.

Thus, children are not unable to derive implicatures; rather, they are simply unable to lexically associate the weak scalar term with the stronger scalar term.

Recent research on free choice inferences (from *The hen is allowed to push the train or the boat* to *The hen is allowed to push the train and the hen is allowed to push the boat*) also suggests that children have no difficulty deriving implicatures when they do not have to retrieve alternatives from the lexicon, as is generally assumed to be the case with free choice inferences (Barner et al., 2011; Chierchia et al., 2001; Gualmini et al., 2001; Tieu et al., 2016).

Importantly, when children have to retrieve lexical alternatives, being exposed to them helps. In multiple experiments on *some*, Foppolo et al. (2012) have shown that children are more adult-like in their interpretation when they have access to stronger alternatives containing *all*. While in a classical TVJT (Experiment 1), children derived implicatures at a rate of only 42%, in a Felicity Judgement Task (Experiment 5), their performance was adult-like at a 95% rate: when all the chipmunks in a picture were taking a shower and two puppets were describing this situation, one using an appropriate, informative sentence (*All chipmunks are taking a shower*), and the other using an underinformative but true sentence (*Some chipmunks are taking a shower*), children were able to correctly pick the puppet uttering the *all* sentence. Moreover, in Experiment 6, where, before being exposed to underinformative utterances with *some*, children were exposed to correct and incorrect uses of *all*, the rates of implicatures were also relatively high (72.5%) compared with 42% in Experiment 1. More precisely, participants were exposed to (i) a situation in which *all* was used correctly (e.g., the sentence *All the Smurfs went on a boat* describing a situation

in which five out of five Smurfs went on a boat), as well as (ii) a situation in which *all* was incorrectly used, and where *some* would have been appropriate (e.g., the sentence *The dwarf picked up all the carrots* describing a situation in which a dwarf picked up three out of five carrots). Only after being acquainted with these correct and incorrect uses of *all* did participants have to evaluate utterances with *some.* This double exposure helped children interpret *some* in a more adult-like manner.

Finally, as detailed previously, Skordos and Papafragou (2016) also investigated whether the presence of stronger alternatives helps children derive more implicatures with the quantifier *some.* Importantly, they found that, while access to alternatives may matter (Experiment 1), it is not enough to boost implicatures in the absence of a relevant context (Experiment 2). Moreover, relevance alone may have this effect even in the absence of the stronger *all* alternatives (Experiment 3). The nuanced perspective upon alternatives put forth in Skordos and Papafragou (2016) allows us to distinguish between two versions of the Alternatives-Based Account: an Alternatives-Only Account, which assumes exposure to alternatives is enough to boost implicatures, and a Relevant Alternatives Account, which assumes that access to alternatives matters only in relevant contexts, and that relevance plays a crucial part in boosting implicatures.

Interestingly, while Skordos and Papafragou (2016) try to tease apart the role of context and alternatives in interpreting *some*, most of the literature conflates the role of context and the role of access to alternatives. This is mainly because, in many of the experiments conducted on implicatures, multiple manipulations are typically implemented simultaneously. For instance, when the context manipulation occurs via the QUD, as in Ronai and Xiang (2021a) and Ronai and Xiang (2021b), the question itself contains a strong scalar term, such that both context and lexical access to the stronger scale-mate may be argued to boost implicatures.

### 2.3. Disjunction in child language

As far as the interpretation of disjunction in child language is concerned, there is a vast literature that shows that children behave differently from adults. Notably, adults tend to interpret simple disjunctions exclusively and inclusively while showing a preference for exclusive interpretations in the case of complex disjunctions (Chierchia et al., 2001; Gualmini et al., 2001; Nicolae & Sauerland, 2016; Nicolae et al., 2024, 2025, among others). In contrast, children have been shown to interpret both simple and complex disjunctions in more varied ways: inclusively, conjunctively, and exclusively. As observed by Singh et al. (2016) for English, Tieu et al. (2017) for French and Japanese, and Bleotu et al. (2023) for Romanian, children interpret disjunction inclusively (*The hen pushed one and possibly both*) or conjunctively (*The hen pushed both*). However, German children interpret these inclusively or exclusively (Sauerland & Yatsushiro, 2018). Interestingly, children generally treat simple and complex disjunctions on a par, unlike adults, who are generally more prone to exclusive readings with complex disjunctions (Nicolae et al., 2024, 2025; Spector, 2014).

In theoretical terms, children's inclusive behaviour has been typically explained as a logical interpretation of disjunction, along the lines of Noveck's (2001) claim that children are generally more logical than adults.

According to the Relevance-Based Account (Degen, 2013; Guasti et al., 2005; Ronai & Xiang 2021a, 2021b; Skordos & Papafragou, 2016; Yang et al., 2018; Zondervan et al., 2008, among others), children should become more exclusive, deriving more implicatures

**Table 1.** Alternatives accessed by children and adults

| Alternatives | Children | Adults |
|---|---|---|
| ALT((either) A or B) | {A, B} | {A, B, A and B} |

with disjunction, if the disjunctive utterance is embedded in a pragmatically relevant context. According to the Alternatives-Based Account (Barner et al., 2011; Tieu et al., 2016, 2017, among others), children should become more exclusive if they have access to stronger conjunctive alternatives, which increase their awareness of the ⟨*and, or*⟩ scale.

In contrast, no consensus has yet been reached with respect to children's conjunctive interpretation of disjunction. Several possible explanations have been proposed, however. One such proposal put forth by Singh et al. (2016) and endorsed by Tieu et al. (2017) is the implicature account, according to which this interpretation is derived by children as an implicature. One way to implement this is via recursive exhaustification, that is, children are actually able to exhaustify, but, differently from adults, they do so over a different set of alternatives. While adults have lexical access to the alternatives *A*, *B*, and *A and B*, children only have access to the alternatives *A* and *B* (see Table 1).

According to Singh et al. (2016), adults derive implicatures from disjunction by accessing and then negating the stronger conjunctive alternative, as in (20):

(20)    The hen pushed the train or the boat.
   (a)    The hen pushed the train and the boat.
   (b)    NOT (The hen pushed the train and the boat)
          = The hen didn't push the train and the boat

In contrast, children only have access to the individual disjunct alternatives, and consequently exhaustify over them. Exhaustification proceeds recursively (21): at Step 1, children exhaustify separately over each of the disjunct members ((21b) and (21c)); at Step 2, they exhaustify over each disjunct member separately once again, and then conjoin the resulting meanings (21d). In conjunction with the initial disjunctive meaning, the result is the conjunctive interpretation in (21e).

(21)    The hen pushed the train or the boat.
   (a)    EXH (EXH (The hen pushed the train or the boat))
   (b)    EXH (The hen pushed the train)
          = The hen only pushed the train
   (c)    EXH (The hen pushed the boat)
          = The hen only pushed the boat
   (d)    NOT (EXH (The hen pushed the train)) and NOT (EXH (The hen pushed the boat))
          = The hen didn't push only the train and didn't push only the boat
   (e)    The hen pushed the train or the boat and NOT (EXH (The hen pushed the train)) and NOT (EXH (The hen pushed the boat))
          = The hen pushed both the train and the boat

Another proposal put forth in the literature is that disjunction is ambiguous between disjunction and conjunction (Sauerland & Yatsushiro, 2018). It may be that, at an early stage in development, children disambiguate between these two meanings by observing the Strongest Meaning Principle (22), reminiscent of the Semantic Subset Principle (Crain et al., 1994).

(22)    Strongest Meaning Principle (cf. Dalrymple et al., 1998, among others)
    If S is ambiguous between interpretations $\alpha$ and $\beta$ and $\alpha \rightarrow \beta$, then the weaker interpretation $\beta$ is inaccessible.

Sauerland and Yatsushiro (2018) argue that, contrary to the implicature account, the ambiguity approach predicts the absence of conjunctive interpretations for complex disjunctions, which are unambiguous and tend to generally express exclusive meanings. Their claim, however, is not supported by the data from German children, whose responses varied between inclusive and exclusive (see Sauerland & Yatsushiro, 2018, for a more detailed discussion).

A related, yet different proposal is that children's conjunctive interpretation of disjunction is a semantic default, that is, children start out thinking that disjunction has the same meaning as a conjunction (Aloni et al., 2024), essentially because of two cognitive biases: a neglect zero bias, driving children towards avoiding empty configurations, and a no split bias, driving children not to split states that involve entertaining several alternatives. Children gradually develop from a conjunctive interpretation to an inclusive one, where the ability to split states has been acquired, and then to an exclusive one, where children additionally develop scalar reasoning. The proposal differs from the ambiguity account in that it assumes that children initially start out only with the conjunctive meaning rather than both conjunctive and inclusive meanings.

Finally, another proposal is that the conjunctive interpretation of disjunction is not a real interpretation grounded in grammar but rather an experimental artefact, a repair strategy motivated by the experimental set-up (Huang & Crain, 2020; Skordos et al., 2020). Both Huang and Crain (2020) and Skordos et al. (2020) make this claim as a comment on the experimental design used in Tieu et al. (2017): a TVJT in a predictive mode, where a puppet would make a guess about the actions of a character with respect to two objects, and participants had to evaluate whether the puppet guessed well or not. According to Huang and Crain (2020), making a guess in the form of a disjunction when there are only two objects in the background is not felicitous in a guessing game context, as it does not add new information to the discourse context. Consequently, as a repair strategy, children will default to the more informative conjunctive interpretation. Huang and Crain (2020) and Skordos et al. (2020) argue that adding more objects to the background leads to the disappearance of conjunctive interpretations from children's responses, a claim supported by evidence from experiments with disjunctive statements and three objects in the background instead of two.

Interestingly, of the accounts presented above (the implicature account, the ambiguity account, the conjunctive default account, and the experimental artefact account), only the implicature account clearly predicts that lexical access to alternatives leads to more exclusivity (as a result of an implicature boost). We elaborate on this in Section 4.1. But before doing so, it is important to dwell a bit on the importance of investigating disjunction in Romanian.

## 3. Motivation for investigating Romanian: Choice of disjunction markers for the current study

Romanian is a good testing ground for the acquisition of disjunction, given that the topic has been understudied in this language. There are only a few studies that have looked at disjunction in Romanian (Lungu et al., 2021; Nicolae et al. 2024, 2025), and most of these

studies have probed into adult behaviour rather than child behaviour. Importantly, Romanian employs many disjunctions: simple disjunctions such as *sau* and *ori* "or", and complex disjunctions such as *sau…sau*, *ori…ori*, and *fie…fie* "either…or". Interestingly, the simple disjunctions mentioned above may be uttered with (at least) two different intonational contours: (i) a neutral prosody with no prosodic boundary after the first disjunct and (ii) a marked intonation, where both disjuncts are stressed, as in complex disjunctions (see https://osf.io/s35k9/?view_only=50e84fd58b36436cb8f9621b a3e75a84). The complex disjunctions also take different forms. On the one hand, we have complex disjunctions that consist of the reduplication of the simple counterpart (*sau…sau* vs. *sau*, *ori…ori* vs. *ori*). This is similar to *ka…ka* vs. *ka* in Japanese and *ou…ou* vs. *ou* in French (see Tieu et al., 2017). On the other hand, we have the complex disjunction *fie…fie*, which lacks a simple counterpart. This is similar to *soit…soit* vs. *ou* in French (see Spector, 2014; Tieu et al., 2017).

From the array of disjunctions mentioned above, in the current study, we chose to focus on three of them: marked *sau*, *sau…sau*, and *fie…fie*. Our choice of disjunction markers was informed by a corpus study conducted on the Romanian Web Corpus 2016 (*roTenTen*), which revealed that, among simple disjunctions, the simple disjunction *sau* is the most frequent one. Since intonation is not coded in written text, the presence of *sau* may be either an instance of neutral *sau* or marked *sau*. Recent studies by Bleotu et al. (2023) and Bleotu et al. (2024b) looked at possible differences between these two prosodic variants of *sau*, motivated by previous findings from the literature suggesting that prosody may lead to interpretive differences (Armstrong, 2014, 2020; Gotzner et al., 2013, 2016; Jasbi et al., 2018, 2024; Meertens et al., 2019). Bleotu et al. (2023, 2024b) found that, unlike adults, who tend to be more exclusive with marked *sau* than with neutral *sau*, children treat the two simple disjunctions alike, interpreting them both inclusively. Importantly though, given that one of our present research goals is to probe into the effect of conjunctive questions upon children's derivation of implicatures with disjunction, and neutral *sau* is not natural when occurring as an answer to a question such as that in (23), but marked *sau* is (24), we decided to test only marked *sau*.

(23)  (a)  A împins găina trenul **şi** barca?
            "Did the hen push the train and the boat?"
      (b)  ??Găina a împins trenul **sau** $_{\text{NEUTRAL}}$ barca.
            "The hen pushed the train or the boat."

(24)  (a)  A împins găina trenul **şi** barca?
            "Did the hen push the train and the boat?"
      (b)  Găina a împins TREnul **sau** $_{\text{MARKED}}$ BARca.[2]
            "The hen pushed the train or the boat."

As far as complex disjunctions are concerned, we decided to test both *sau…sau* and *fie…fie*. This choice was partly motivated by frequency: from a corpus perspective (see Bleotu et al., 2023), these are the most frequent complex disjunctions in adult Romanian, with *sau…sau* being more frequent than *fie…fie*, as revealed by a corpus study of

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[2]The syllables in capitals receive the prosodic stress.

Romanian Web 2016 (*roTenTen*). However, it was also motivated by the fact that previous studies focused exclusively on the contrast between one simple disjunction and one complex disjunction (Braine & Rumain, 1981; Paris, 1973), but never looked at multiple complex disjunctions within the same language, as well as by the expectation that there may be interesting differences among complex disjunctions. Such an investigation may prove particularly insightful if we consider the possible effect of reduplication upon interpretation. When hearing a disjunction such as *sau…sau*, children may interpret it in the same way as *sau* by way of overgeneralisation. However, for *fie…fie*, it seems more plausible that they would interpret it in a different way, given that there is no simple disjunction *fie* in the language. Moreover, the syncretism between the disjunctive *fie* and the present subjunctive of *be* may also affect how children interpret *fie…fie*: it could lead them down the garden path of the subjunctive realm, which could pose additional difficulties (Tulling & Cournane, 2022). This is supported by a recent study by Bleotu et al. (2023), where children were found to be conjunctive with *fie…fie* but not with *sau*-based disjunctions.

Additionally, looking at multiple disjunctions may provide important insights into theories of implicature derivation: Can all disjunctions be explained through the implicature account or do we need other accounts instead/as well? Does variation in data call for different theoretical accounts?

## 4. Current experiments

Our study extends the investigation of the role of alternatives and relevance, previously conducted by Foppolo et al. (2012) and Skordos and Papafragou (2016) for *some*, to the domain of disjunction. In particular, we explore how Romanian-speaking children interpret different types of disjunctions in the absence of conjunctive statements, and whether more exclusive interpretations are observed when (i) children are exposed to conjunctive statements (alternatives) and (ii) the disjunctive statements are presented as answers to questions that contain conjunction. Our main research question is whether access to conjunctive statements (alternatives) is enough to boost exclusivity implicatures, or whether access to alternatives and contextual relevance (introduced through an explicit QUD) are both needed. We conducted three experiments.[3]

In Experiment 1 (Baseline), participants heard disjunctive statements but not conjunctive statements.[4] In Experiment 2 (Alternatives), participants heard disjunctive statements and (unrelated) conjunctive statements. Importantly, similarly to Experiment 6 in Foppolo et al. (2012) and Experiment 1 in Skordos and Papafragou (2016), participants heard conjunctive statements both in situations where these were true, as well as in situations where the conjunction was falsified. Importantly, exposure to conjunctive utterances always preceded exposure to disjunctive utterances. In Experiment 3 (Alternatives & QUD), participants heard the disjunctive statements as answers to conjunctive questions. Our design essentially aimed at comparing participants' interpretations of disjunction in *no conjunction* versus *conjunction only* versus *conjunction plus relevance* conditions. Experiment and disjunction type were both between-subject factors.

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[3]The research reported here was approved by the Research Ethics Committee in Bucharest (89/20.03.2023).
[4]Note that Experiment 1 (Baseline) here also appears as Experiment 2 of Bleotu et al. (2024a).

### 4.1. Predictions

Overall, we expect that adults should be exclusive in all three experiments, given that they have been shown to be exclusive with disjunction even in the absence of a stronger conjunctive alternative or a relevant QUD (see Bleotu et al., 2023; Tieu et al., 2017). Potentially, we could see an increase in implicatures in Experiment 2 (Alternatives) and Experiment 3 (Alternatives & QUD) compared with Experiment 1 (Baseline), based on previous findings that even adults may derive more implicatures in the presence of stronger alternatives (see, e.g., Bleotu & Benz, 2024; Ronai & Xiang, 2021a).

As far as children are concerned, we predict that children should in principle interpret disjunction inclusively in Experiment 1 (Baseline), given that they are assumed to start out by being more logical in their interpretation (Noveck, 2001). In light of previous findings from Singh et al. (2016) and Tieu et al. (2017), some children might also display evidence of conjunctive interpretations of disjunction.

As for Experiment 2 (Alternatives) and Experiment 3 (Alternatives & QUD), different accounts make different predictions. The Alternatives-Based Account assumes children's difficulty with implicatures stems from a difficulty in the retrieval of lexical alternatives. In an Alternatives-Only version of the account, mere access to alternatives should be enough to boost implicatures, so children should be more exclusive in both Experiments 2 and 3, given that they are exposed to conjunction (as part of assertions in Experiment 2 and questions in Experiment 3). Importantly, given previous findings from Foppolo et al.'s (2012) Experiment 6 (children derived more implicatures with *some* when they had access to both true and false stronger *all* alternatives), we expect a significant boost in implicatures in Experiment 2 (Alternatives) compared to Experiment 1 (Baseline), given that in Experiment 2, participants are made more aware of the use of *and* by being exposed to both true and false conjunctive utterances. They should thus be more likely to derive a *not both* implicature for *or*. We also expect a boost in implicatures in Experiment 3 (Alternatives & QUD), given that the questions participants are exposed to contain conjunction.[5] In the Relevant Alternatives version of the account, where relevance plays a specified role in implicature derivation, children should show a boost in exclusivity implicatures in Experiment 3, but not necessarily in Experiment 2.

Finally, the Relevance Account, which assumes that children's difficulty with implicatures stems from a failure to accommodate the utterances at issue in a relevant context, is similar to the Relevant Alternatives version of the Alternatives-Based Account. It also predicts that children should be (more) exclusive with disjunction only in Experiment 3 (Alternatives & QUD), where the disjunctive utterance is presented as an answer to an explicit question.

### 4.2. Participants

We collected data from 500 participants: 257 typically developing monolingual Romanian-speaking 5- and 6-year-old children and 243 adult native-speaker controls. Experiment 1 (Baseline) was conducted with 85 children (mean age 5;04) and 71 adults. More specifically, we tested 27 children and 21 adults on marked *sau*, another group of 28 children and 27 adults on *sau…sau*, and a different group of 30 children and 23 adults on *fie…fie*.

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[5]Given the interpretive variation uncovered in Bleotu et al. (2023), it is unclear whether children will treat all disjunctions in the same manner: children might derive more implicatures with *sau*-based disjunctions than with *fie…fie*, which might be interpreted conjunctively at a higher rate.

Experiment 2 (Alternatives) was conducted with 86 children (mean age 5;04) and 83 adults. More specifically, we tested 32 children and 23 adults on marked *sau*, a different group of 27 children and 30 adults on *sau…sau*, and a different group of 27 children and 30 adults on *fie…fie*. Experiment 3 (Alternatives & QUD) was conducted with 86 children (mean age 5;06) and 89 adults. More specifically, we tested 27 children and 35 adults on marked *sau*, 27 children and 26 adults on *sau…sau*, and a different group of 32 children and 28 adults on *fie…fie*.[6]

## 4.3. Methodology and materials

Building on the materials and design of Tieu et al. (2017), we ran three modified TVJTs presented in Prediction Mode rather than Description Mode (Singh et al., 2016). Such a task licenses ignorance inferences, which often characterise disjunctive statements. Participants were introduced to a puppet, whose statements were pre-recorded. The task proceeded in three steps:

  (i)  For each story, Bibi made a guess about what would happen.
 (ii)  Participants then saw the outcome.
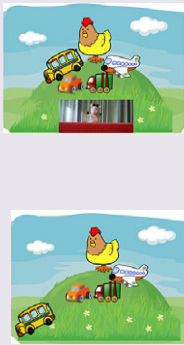(iii)  They then had to say whether Bibi had guessed well.

As detailed previously, we employed multiple disjunctions: marked *sau* (which is felicitous in utterances that represent answers to questions, unlike neutral *sau*), *sau…sau*, and *fie…fie*. These disjunctions were tested in a between-subjects design, each in a different variant of the experiment, in order to ensure that participants' interpretation of disjunction would not be influenced by being exposed to the other disjunction types. In short, no participant completed more than one experiment, and no participant saw more than one disjunction type.

In Experiment 1 (Baseline), participants started with two practice trials, where the puppet made two guesses (one good and one bad). The test phase consisted of 13 experimental trials, in which participants heard disjunctive statements such as *The hen pushed the bus or the airplane*, presented in two kinds of contexts: **1-disjunct-true (1DT)** (×4), in which, for example, the hen pushed only the bus, and **2-disjunct-true (2DT)** (×4), in which, for example, the hen pushed both the bus and the airplane. We also included a false control condition, **0-disjunct-true (0DT)** (×2), in which the hen pushed neither object. Participants also heard three fillers that contained no disjunction. Table 2 provides examples of experimental items for the 1DT condition, where the character acted only upon one object.

Importantly, to address the potential objection that children's conjunctive interpretations are an experimental artefact related to the number of objects in the context, we introduced additional objects in the background so that four objects were present, even though the test sentences mentioned only two.

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[6]Note that the data were collected in two batches (the second dataset was collected at the request of the reviewers and the editor, following concerns about statistical power). We checked for all possible effects of the dataset and found no significant differences between the two datasets (simple effect: $\chi^2(1) = 0.086$, $p = .93$; one-way interactions: $\chi^2(7) = 7.1$, $p = .42$; two-way interactions: $\chi^2(7) = 7.1$, $p = .42$); we therefore collapse them in the reporting above.

**Table 2.** Example experimental item with marked *sau* for the 1-disjunct-true (1DT) condition in Experiment 1

| 1DT | Pictures |
|---|---|
| SCENE 1: There once was a hen who loved to play with her toys, and she especially loved to push them around! One day her papa gave her four new toys: a bus, a car, a truck, and a plane. The hen was very happy to play with them.<br>Let's see if Bibi can guess what happened next!<br>SCENE 2: EXPERIMENTER: Bibi, tell us, what happened next?<br>    BIBI: Găina a împins autobuzul sau avionul.<br>      "The hen pushed the bus or the plane."<br>    EXPERIMENTER: Let's see if Bibi's right!<br>SCENE 3: (following the animation of the hen pushing the bus down the hill):<br>Look, the hen pushed this! Did Bibi guess well? | <br><br> |

In Experiment 2 (Alternatives), participants heard disjunctive statements after hearing unrelated conjunctive statements. For example, participants might hear a conjunctive statement referring to the actions of a deer in one story, and then hear a disjunctive statement in the subsequent story referring to the actions of a hen.
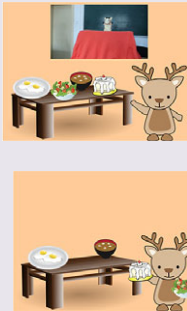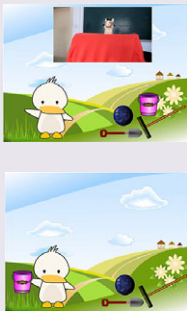
Experiment 2 was inspired by Foppolo et al. (2012) and Skordos and Papafragou (2016). It contained 26 sentences: 2 warm-up sentences and 24 test sentences presented in four pseudo-randomised blocks (4 × 6 sentences) where disjunctive statements were always preceded by conjunctive statements presented in 2-conjunct-true (2CT) and 1-conjunct-true (1CT) contexts. A sentence block thus consisted of a true 2CT conjunctive statement, a false 1CT conjunctive statement, a 1DT disjunctive statement, a 2DT disjunctive statement, a 0DT disjunctive statement, and a true/false filler. Table 3 provides examples of conjunctive items employed in Experiment 2. The disjunctive utterances were identical to those in Experiment 1 (see Table 2 for an example of an item in the 1DT condition).

Experiment 3 (Alternatives & QUD) differed from Experiment 1 (Baseline) in that the disjunctive statement represented an answer to a conjunctive question, as illustrated in (25). The question was presented with a natural rising intonation.

(25)　(a)　A împins găina trenul **și** barca?
　　　　　　"Did the hen push the train and the boat?"
　　　(b)　Găina a împins trenul **sau** barca.
　　　　　　"The hen pushed the train or the boat."

While all experiments involved a story with a potential implicit QUD (e.g., *What objects did the hen push?*), Experiment 3 (Alternatives & QUD) employed an explicit question that made the stronger conjunctive alternative available and contextually relevant. Otherwise, the experiment employed the same design and materials as Experiment 1 (see Table 2).

**Table 3.** Example experimental items with marked *sau* for the 2-conjunct-true (2CT) and 1-conjunct-true (1CT) conditions in Experiment 2

| 2CT | Pictures |
|---|---|
| SCENE 1: There once was a deer who loved eating!<br>One day she received some food from her friends.<br>Let's see if Bibi can guess what happened next!<br>SCENE 2: EXPERIMENTER: Bibi, tell us, what happened next?<br>    BIBI: Căprioara a ales o prăjitură şi o salată.<br>    "The deer chose a cake and a salad."<br>    EXPERIMENTER: Let's see if Bibi's right!<br>SCENE 3: (after the deer chooses the cake and the salad):<br>Look, the deer chose this and this! Did Bibi guess well? | |

| 1CT | Pictures |
|---|---|
| SCENE 1: There once was a duck who<br>loved playing outside! One day she received some toys from her friends.<br>Let's see if Bibi can guess what happened next.<br>SCENE 2: EXPERIMENTER: Bibi, tell us, what happened next?<br>    BIBI: Răţusca a preferat o minge şi o găleată.<br>    "The duck picked a ball and a bucket."<br>    EXPERIMENTER: Let's see if Bibi's right!<br>SCENE 3: (after the duck picked the bucket):<br>Look, the duck picked this! Did Bibi guess well? | |

### 4.4. Data analysis

The data and scripts for the statistical analyses below are available on OSF.[7]

Only participants who displayed above 50% accuracy on the fillers and 0DT controls were included in the analyses. This criterion led to the exclusion of seven child participants and five adult participants. For Experiment 2, we also assessed participants' accuracy on the conjunctive statements. Children's accuracy on the conjunctive statements was 91.5% (86.9% for 1CT and 96.1% for 2CT), whereas adults' accuracy on the conjunctive statements was 98.15% (97.5% for 1CT and 98.8% for 2CT).

Figure 2 displays the percentage of *yes*-responses to the 1DT and 2DT conditions, across groups, experiments, and disjunction types.

The 1DT and 2DT responses were used to categorise each participant for the planned analyses, as illustrated in Figure 3 and explained below:

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[7]See the link here: https://osf.io/y3h4t/?view_only=855e51723506423c8c13b06e3d8b57e9.
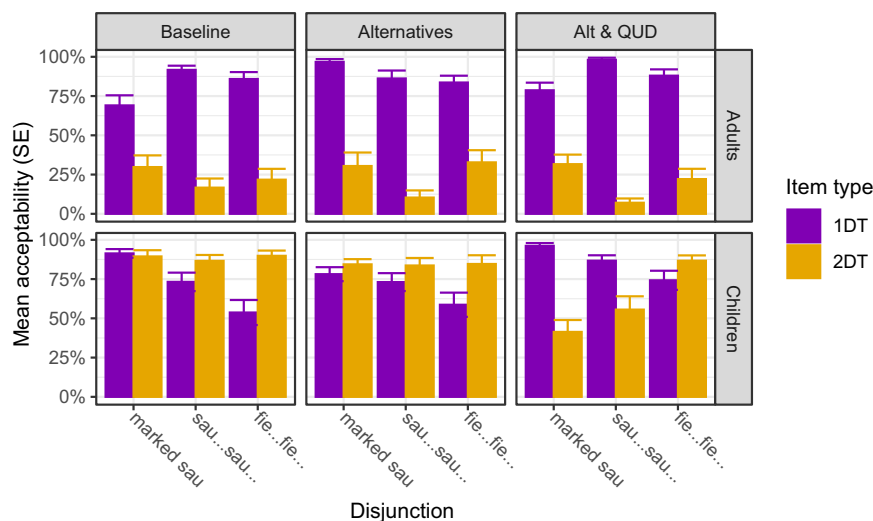
**Figure 2.** Percentage of *yes* responses from children and adults to 1DT and 2DT conditions, across disjunction types and experiments.
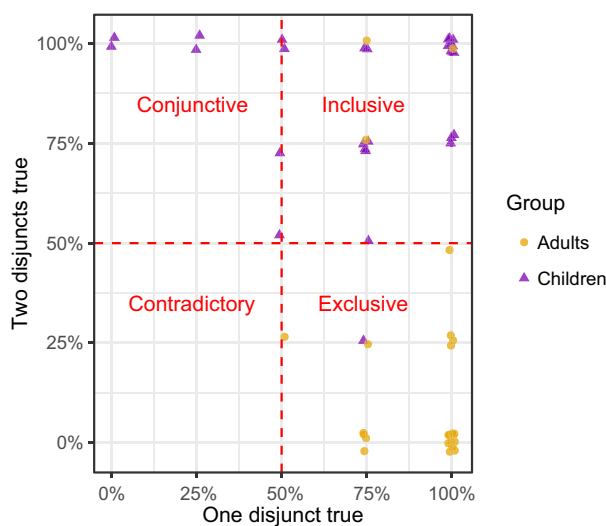


**Figure 3.** Categorisation of participants in the *sau sau* Baseline task, to illustrate how participants were classified based on their responses to 1DT (*x*-axis) and 2DT (*y*-axis) trials. In this case, 18 children were categorised as inclusive, 4 children were categorised as conjunctive, 5 as mixed, and 1 as exclusive. 3 adults were inclusive, 2 were mixed, and the remaining 22 were exclusive.

- Participants who accepted more than 50% each of both 1DT and 2DT items were categorised as *inclusive*.
- Participants who accepted more than 50% of 1DT items but less than 50% of 2DT items were categorised as *exclusive*.
- Participants who accepted more than 50% of 2DT items but less than 50% of 1DT items were categorised as *conjunctive*.

- Participants who accepted less than 50% of both 1DT and 2DT items were categorised as *contradictory* (since this behaviour amounts to treating disjunctions as contradictions).[8]
- Finally, participants who accepted exactly 50% of items in either 1DT or 2DT condition were labelled as *mixed*.

Statistical analyses were carried out on the counts of participants falling in each category for the different factor combinations. We decided against analysing raw responses with a mixed-effects logistic regression. The main reason is that most implementations of mixed models assume a cantered normal distribution for the random effects (even for logistic regression, the random effects are assumed to be normally distributed on the log-odds scale). This assumption goes directly against the observation that most participants consistently adopt one or another interpretation for ambiguous target sentences. Indeed, if the latter is correct, the random effects would follow a multimodal distribution, not a Gaussian one. After discussion with the reviewers and editors, we did fit a logistic regression with maximal random effect structure, and while the model converged, the by-participants random effects did not follow a cantered multivariate Gaussian distribution. The estimated fixed effects from this model were therefore uninterpretable. The counts of the "mixed" participants were not analysed, since they do not constitute a consistent category (but as explained below, they were counted when determining the total number of participants per task). We used the "contradictory" participants as the reference level (in this way, any category that is significantly higher than the reference level can be interpreted as a reading of disjunction that is significantly more available than chance errors).

The counts were analysed with a Poisson model using log-link and the total number of participants who completed a given task with a given disjunction as the offset. The offset in a Poisson model is a correction for the fact that the total number of participants may differ between conditions. Mixed participants contributed to the offset, even though the model was fitted on data excluding these participants, as the estimated rates for the other categories would be overestimated otherwise. Effects were tested by comparing models with and without the predictor of interest, using likelihood ratio tests.[9] To summarise, our dependent variable will be the count of participants, and, unless otherwise specified, our predictors are Category (four levels), Disjunction type (three levels), and Task (three levels). Although Group (two levels) is an important factor, prior research has shown that adults and children interpret disjunctions very differently. Because of this, and given the already high number of predictors, we decided to analyse the child and adult data separately rather than include Group as a predictor.

Finally, we corrected for multiple comparisons (since both manipulations have a chance to lead to an increase in implicatures with children). Since we are not interested in main effects but rather interactions with Category, we applied a conservative

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[8]Another possible interpretation of their rejection of disjunctive statements in both 1DT and 2DT conditions could be that they think the disjunctive utterance is not felicitous as a guess, and they would prefer a non-disjunctive statement instead.

[9]Note that this approach is a generalization of the *G*-test, an alternative to Pearson's $\chi^2$ test (McDonald, 2014). In the case of a simple interaction between Category and another factor, our approach is strictly equivalent to the standard *G*-tests (as implemented in the R package AMR for instance; Berends et al., 2022), but the use of Poisson models allows us to test higher-order interactions, as well as to maintain the familiar formula description of linear models in R.

**Table 4.** Count of participants in each category by task and disjunction type

| (a) Children | | | | | | |
|---|---|---|---|---|---|---|
| Task | Disjunction | Incl. | Conj. | Excl. | Contr. | Mixed |
| Baseline | marked *sau* | 22 | 0 | 1 | 0 | 3 |
| Baseline | *sau…sau…* | 18 | 4 | 1 | 0 | 5 |
| Baseline | *fie…fie…* | 12 | 12 | 0 | 0 | 3 |
| Alternatives | marked *sau* | 21 | 1 | 0 | 0 | 10 |
| Alternatives | *sau…sau…* | 16 | 3 | 1 | 0 | 6 |
| Alternatives | *fie…fie…* | 13 | 7 | 1 | 1 | 4 |
| Alt & QUD | marked *sau* | 8 | 0 | 16 | 0 | 2 |
| Alt & QUD | *sau…sau…* | 11 | 0 | 11 | 0 | 5 |
| Alt & QUD | *fie…fie…* | 21 | 5 | 0 | 0 | 6 |
| (b) Adults | | | | | | |
| Task | Disjunction | Incl. | Conj. | Excl. | Contr. | Mixed |
| Baseline | marked *sau* | 1 | 2 | 12 | 1 | 5 |
| Baseline | *sau…sau…* | 3 | 0 | 22 | 0 | 2 |
| Baseline | *fie…fie…* | 3 | 1 | 17 | 0 | 2 |
| Alternatives | marked *sau* | 5 | 0 | 15 | 0 | 3 |
| Alternatives | *sau…sau…* | 2 | 0 | 23 | 2 | 2 |
| Alternatives | *fie…fie…* | 5 | 1 | 20 | 0 | 3 |
| Alt & QUD | marked *sau* | 6 | 1 | 17 | 3 | 7 |
| Alt & QUD | *sau…sau…* | 0 | 0 | 25 | 0 | 1 |
| Alt & QUD | *fie…fie…* | 1 | 0 | 20 | 0 | 5 |

Bonferroni correction with $m = 6$ (2 degrees of freedom from Task $\times$ 3 degrees of freedom from Category). Where relevant, corrected $p$-values are given as $p'$.

## 4.5. Results

Table 4 gives the full distribution of participants across the different categories, for each combination of task and disjunction type. Figure 4 summarises this data in a graph.

*Children's results*: We found no triple interaction among Disjunction, Category, and Task ($\chi^2(12) = 14, p = 0.3, p' = 1$), so we dropped it from the model for subsequent tests. We found no significant difference between the Baseline and Alternatives tasks ($\chi^2(3) = 2.1, p = 0.55, p' = 1$), but a clear difference between the Baseline and Alt & QUD tasks ($\chi^2(3) = 41.6, p = 4.8 \times 10^{-9}, p' = 2.9 \times 10^{-8}$).

These tests looked for any difference in the distribution of child participants among categories. As a post hoc analysis, we looked at which categories are responsible for the difference between the Baseline and Alt & QUD tasks using the `emmeans` package. The marginal means showed that the significant interaction is driven by a combination of
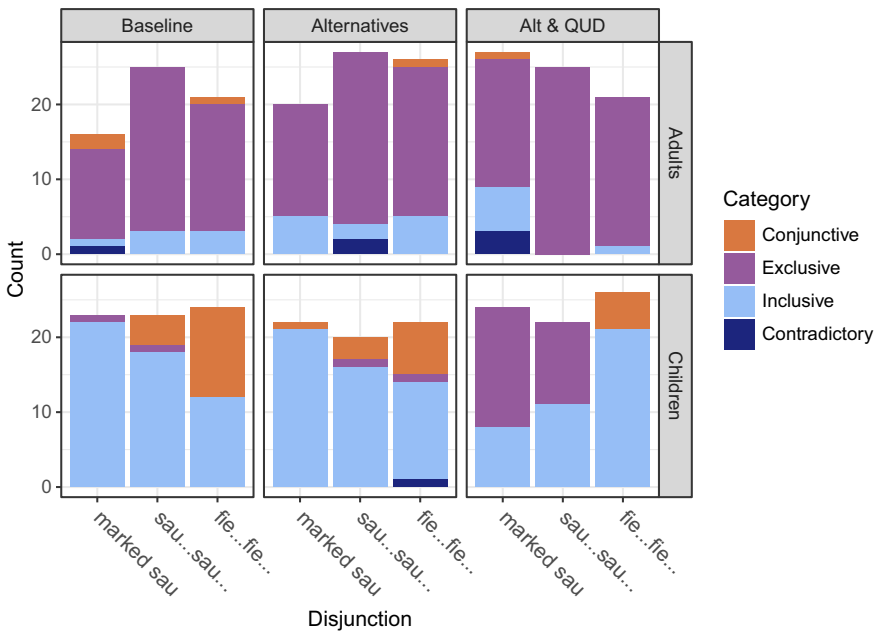
**Figure 4.** Distribution of participants across categories (excluding the Mixed category) by group, task, and disjunction type.

lower rates of inclusive (0.64 to 0.47) and conjunctive readings (0.20 to 0.06) and a higher rate of exclusive readings ( 0.02 to 0.32) in the Alt & QUD task, none of which is significant on its own.

We also found a significant interaction between Category and Disjunction types ( $\chi^2(6) = 58.7, p = 8.1 \times 10^{-11}$). A post hoc inspection of marginal means showed a very small difference between marked *sau* and *sau...sau*; the latter seems to elicit a bit more conjunctive readings. Importantly, *fie...fie* had lower rates of inclusive participants, no exclusive participants, and higher rates of conjunctive participants than all *sau*-disjunctions.

Since we did not find any evidence of a triple interaction, there is no point in further exploring how the different readings vary across tasks for each disjunction separately.

*Adults' results*: The triple interaction was not significant for adults either ($\chi^2(12) = 17.4, p = 0.13, p' = 0.80$). This time we found no significant differences between either the Alternatives or the Alt & QUD task and the Baseline ($\chi^2(3) = 2.31, p = 0.51, p' = 1$ and $\chi^2(3) = 2.65, p = 0.45, p' = 1$, respectively).

However, we did find a significant interaction between Disjunction and Category ($\chi^2(6) = 17.8, p = 0.0066$). For adults, the marginal means paint a very different picture. Unlike with children, where the interaction was driven by a categorically different behaviour of the *fie...fie* disjunction, with adults we observe small quantitative differences between the three types of disjunction, with *fie…fie* positioned right in the middle between marked *sau* and *sau...sau*. In particular, the estimated marginal rates of exclusive interpretations are 0.56 for marked *sau*, 0.73 for *fie...fie*, and 0.85 for *sau...sau*.

## 5. Discussion

Adults interpreted all disjunctions exclusively, across all three experiments – an expected pattern, given that adults are known to generally be exclusive with disjunction even in the absence of exposure to conjunctive alternatives or explicit questions containing conjunction.

Children's behaviour in Experiment 3 (Alternatives & QUD), but not Experiment 2 (Alternatives), differed significantly from the patterns displayed in Experiment 1 (Baseline). In Experiments 1 and 2, children were mostly inclusive with both *sau*-based disjunctions.[10] In Experiment 3 (Alternatives & QUD), there were significantly more children who interpreted the disjunctions exclusively. By contrast, children interpreted *fie…fie* either conjunctively or inclusively, with more conjunctive interpretations in Experiments 1 and 2, and more inclusive interpretations in Experiment 3.

Children's behaviour with the *sau*-based disjunctions is in line with the idea that children are logical by default but derive more scalar implicatures when the stronger scalar alternative is salient and contextually relevant. The observed contrast between Experiments 2 and 3 suggests that simply hearing statements containing conjunctions alongside statements containing disjunctions is not enough to boost implicatures. Even if the conjunction was made relevant in the conjunctive trials, children evidently did not carry over its relevance across trials to the disjunctive ones.

To derive more exclusivity implicatures, children seem to need (explicit) contextual relevance, as provided by an explicit question that makes reference to the situation at issue (not to a different situation). While an Alternatives-Only version of the Alternatives-Based Account might predict an increase in implicature rates in both Experiments 2 and 3 (by simple exposure to the conjunctive alternative), the Relevance Account and a Relevant Alternatives version of the Alternatives-Based Account predict a boost in implicatures only in Experiment 3. Thus, our results for *sau*-based disjunctions are most compatible with accounts that take into consideration the relevance of the scalar alternatives, as opposed to the mere presence of alternatives.

In relation to previous findings in the literature, the results from the *sau*-based disjunctions suggest that explicit alternatives and contextual relevance are both needed for implicature derivation. Overall, this mirrors what was observed for quantifiers by Skordos and Papafragou (2016), who found that access to the stronger alternative *all* led to an increase in implicatures only when it was made relevant.

Interestingly though, some differences can be noted regarding how relevance influences implicature derivation in disjunction versus quantifiers. In a recent follow-up study, Bleotu et al. (2025b) aimed to disentangle the roles of explicit alternatives and relevance in disjunction by examining whether mere relevance, without exposure to explicit alternatives, influenced implicature derivation. Children were exposed to disjunctive utterances after hearing relevant questions that did not make use of conjunction, such as *Did the hen push these two objects?* Interestingly, they did not become more exclusive compared to the Baseline experiment. In contrast, Skordos and Papafragou's Experiment 3 showed that contextual relevance can even override the importance of access to alternatives, given that their child participants derived more implicatures with *some* even when they were not provided with the *all* alternative, but rather with utterances containing *none*. Such

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[10]Note that in an alternative analysis where the mixed children are included rather than excluded, we can see that some children oscillate between inclusivity and conjunctivity.

findings suggest that the acquisition of the implicatures of disjunction may be more challenging for children than the implicatures associated with quantifiers.

A reviewer wonders if our Experiment 3 is the only one that makes the conjunctive alternative relevant, given that Experiments 1 and 2 could be considered to involve an implicit QUD. One might argue that Experiment 3 simply makes explicit the QUD that participants were implicitly considering in Experiments 1 and 2; hence, all three experiments actually make use of the same QUD. However, it is not clear to us that participants in Experiments 1 and 2 would entertain the same QUD as in Experiment 3 (*Did the hen push A and B?*), targeting only two of the four objects present in the display. Although some participants in Experiments 1 and 2 may have come up with the same QUD as the explicitly presented one in Experiment 3, it is also possible that the absence of an explicit QUD in Experiment 1 led to a variety of possible QUDs, such as the neutral action-oriented question *What did the hen do?*, the neutral object-oriented question *What did the hen push down the hill?* (also assumed to be the relevant QUD by Skordos et al., 2020), or even an exhaustive quantity-oriented question such as *Did the hen push all four objects?* In fact, the presence of four objects in the display instead of just two could be argued to make an *A & B* QUD even less probable, as participants might wonder about all the objects they see. Employing an explicit *A & B* conjunctive QUD specifically targeting two objects ensured that participants in Experiment 3 were entertaining the same conjunctive QUD. On these grounds, we believe that it makes sense to talk about a contrast between Experiments 1 and 2 and Experiment 3 in terms of relevance: the explicit QUD in Experiment 3 made the conjunctive alternative relevant, whereas the implicit QUD in Experiments 1 and 2 did not necessarily do so. Our results seem to be consistent with this.

Our findings related to children's failure to be exclusive in Experiment 2 require some discussion, given that in a felicity judgement task conducted by Chierchia et al. (2001), children were adult-like in associating situations where only one disjunct (A ∨ B) held with disjunctive utterances and situations where both A and B held with conjunctive utterances. Why were children more adult-like in their tasks? A possible explanation for this could have to do with the role of contrast. In Chierchia et al. (2001), participants heard the disjunctive utterance and the conjunctive utterance in direct explicit contrast, and, importantly, the two utterances were meant to describe the exact same situation. In contrast, in our experiment, participants saw the disjunctive utterances and the conjunctive utterances separately, and, importantly, these utterances make reference to different situations. The presence of contrast and the reference to the same situation could make children more aware of the ⟨*and, or*⟩ scale. Moreover, as argued by Foppolo et al. (2012), children's successes in the Felicity Judgement Task are not to be interpreted as evidence that they are able to derive implicatures but rather simply as evidence that they master one step necessary for implicature derivation, namely, identifying the less informative utterance. Computing implicatures also requires an understanding that *and* does not mean "or".

Interestingly, our design of Experiment 2 was closely inspired by Experiment 6 in Foppolo et al. (2012), yet our manipulation did not lead to a similar boost in implicatures. While in Foppolo et al. (2012), participants heard underinformative utterances with *some* only after hearing utterances with *all* used appropriately (to refer to all entities at issue) and inappropriately (to refer to some entities at issue), in our experiment, participants heard underinformative utterances with *or* only after hearing utterances with *and* used appropriately (to refer to conjunctive situations) and inappropriately (to refer to situations where only one conjunct was the case). While the children in Foppolo et al. (2012) derived implicatures at a high rate, our children did not, showing a rather inclusive

pattern instead. We take this to suggest that relevance plays an even more important role in the interpretation of disjunction than of existential quantifiers, possibly because of the complexity of disjunction. Understanding disjunction involves (i) holding multiple alternatives in mind at the same time, as well as (ii) making additional ignorance inferences, related to the speaker's lack of knowledge about which of the disjuncts is the case. These additional complications may create further challenges for children. Thus, it is not enough for them to be exposed to various uses of *and* to derive more implicatures with disjunction. Rather, it is necessary to also increase the contextual relevance of the strengthened meaning of the disjunctive utterance. An explicit question has the advantage of (i) introducing context, (ii) setting up a contrast, and (iii) making reference to the same situation. It is important to stress, however, that what these findings show is not that relevance on its own increases exclusivity, but rather that access to alternatives and relevance do so jointly (especially as shown by Bleotu et al., 2025b).

Let's turn now to the differences among the disjunctions we tested. Regarding marked *sau* and *sau...sau*, we do not observe any significant differences between the two disjunctions in Experiments 1 and 2, where children are mostly inclusive with both disjunctions, or in Experiment 3, where they become more exclusive than in Experiment 1. The absence of a contrast between the two disjunctions across these experiments suggests that neither prosodic markedness nor morphological markedness (understood here as complexity) is associated with marked (exclusive) interpretations in child Romanian.[11]

Regarding *fie...fie*, our results are somewhat difficult to reconcile with an Alternatives-Based Account. According to Singh et al. (2016), children derive conjunctive meanings because they access the pre-exhaustified disjuncts as alternatives, rather than the conjunctive alternative that adults access. We know that children are capable of exhaustifying (they are able to generate ad hoc implicatures [see Stiller et al., 2015]), they are able to interpret sentences like *Only the cat and the dog are sleeping* exhaustively, drawing on context-dependent alternatives (see Barner et al., 2011), and they are able to recursively exhaustify (they generate free choice inferences [see Tieu et al., 2016]). But when children are explicitly provided with the stronger conjunctive alternative, the expectation should then be that they are able to negate this alternative and generate the exclusivity implicature, rather than the conjunctive one. Yet this is not what we observe for *fie...fie*: children are almost never exclusive with *fie...fie*, but rather inclusive and conjunctive in Experiment 2.

These results are also difficult to reconcile with an account that assumes an important role for relevance in implicature derivation since children are not exclusive but mostly inclusive with *fie...fie* in Experiment 3, where the disjunctive utterance is an answer to a conjunctive question that makes exclusivity relevant.

The conjunctive behaviour observed for *fie...fie* also fails to be explained away as an experimental artefact, given that we designed the materials to include four objects in the background in all three experiments.

Instead, a possible explanation for children's interpretation of *fie...fie* (conjunctive and inclusive in Experiments 1 and 2, and mostly inclusive in Experiment 3) might be couched within an ambiguity account, wherein, in child language, *fie...fie* is ambiguous between an inclusive disjunction and a conjunction. This ambiguity could be related to the lower frequency of *fie...fie* compared to the other disjunctions we tested.

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[11]We do notice a slight tendency in children towards more exclusivity with marked *sau* than with *sau...sau*: there were overall 16 exclusive children with marked *sau* (out of 26) and 11 exclusive children with *sau...sau* (out of 27). However, this tendency is not statistically significant.

On the other hand, the fact that some participants are conjunctive and some are inclusive (and some are mixed) with *fie…fie* could also be explained by a semantic conjunctive default account (see Aloni et al., 2024), which hypothesises that children initially start off with a conjunctive interpretation of disjunction. The more familiar they become with a disjunction, the more likely they are to move towards an adult-like interpretation (going from conjunctivity to inclusivity and then to exclusivity, as argued by Aloni et al., 2024). Under this account, the ambiguity observed for *fie…fie* (and the mixed behaviour observed for all of the disjunctions more generally) reflects children's transition from a conjunctive default state to an inclusive stage. The fact that children are conjunctive with *fie…fie* to a considerable extent in Experiments 1 and 2 but less so with *sau*-based disjunctions could be accounted for if we take into account the relative frequency of the different forms of disjunction. Children should thus default to conjunction more for disjunctions that are less frequent in their input, and, consequently, less known to them. They should thus be more conjunctive with the less frequent *fie…fie*, and rarely exhibit this behaviour with the relatively more frequent disjunctions *sau* and *sau… sau*.[12] If the frequency of disjunctions is not taken into account, then assuming a universal coordinative default for disjunction would predict conjunctive interpretations for all the disjunctions under investigation, which does not seem to be the case.

Under yet another possible account (the subjunctive syncretism account), the conjunctive interpretation of *fie…fie* could be explained by appealing to the syncretism with the present subjunctive form of the verb *to be* (i.e., *(să) fie*), as one can see in example (26): children may take the sequence *fie A, fie B* to be the coordination of two subjunctives, as in example (27) (for similar discussion of this point, see Bleotu et al., 2023 and Bleotu et al., 2024a). Adults would not erroneously treat the disjunction as a *be* subjunctive marker, given their more advanced linguistic knowledge. Thus, adults (almost) unanimously interpret utterances with *fie…fie* exclusively. Children, on the other hand, may be more prone to such confusion, given their tendency to map one meaning to one form (Slobin, 1973).

(26)  Poate            să          fie              obosită.
      may.PRS.IND.3    MRK.SBJV    be.PRS.SBJV.3    tired.
      "She may be tired."

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

Supporting evidence that there may be a link between disjunction/conjunction and the subjunctive comes from other languages where disjunction/conjunction markers are also syncretic with *be* subjunctives (French *soit…soit*, Italian *sia…sia*, among others), and from languages that lack a disjunctive connective but use the subjunctive to express a

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[12]Support for this approach comes from a recent study showing that Romanian children and adults assign a conjunctive interpretation to sentences containing the nonce connectives *mo* and *mo…mo* (Bleotu et al., 2025c). More general support for the idea of a conjunctive default comes from other phenomena such as recursive nominal modifiers, where children seem to initially interpret recursion as coordination (Bleotu & Roeper, 2021a, 2021b; Roeper, 2011).

disjunctive meaning (such as Wari', Chapacura-Wanam), as discussed in Mauri (2008a, 2008b).

The subjunctive is a dependent mood, that is, it acquires the force of its selector: if embedded under the modal *poate* "may" (see example (27)), it acquires existential force (possibility), while if embedded under the strong intensional verb *vrea* "want", it acquires universal force (necessity) (Cotfas, 2017; Farkas, 1984; Giorgi & Pianesi, 1997; Quer, 1998). Moreover, in the main clause uses, there is a debate about whether its force is existential or universal (Grosz, 2008; Oikonomou, 2016; Schwager, 2006). Given that children are exposed to the subjunctive in various contexts, it is unclear whether they will associate the subjunctive with possibility, necessity, or even no modal meaning at all. If necessity is the modal force they opt for, then the conjunctive meaning comes about simply by conjoining the two necessity operators: *fie A fie B* = $\Box A \wedge \Box B$. If the possibility is the modal force they opt for, then they might treat two juxtaposed subjunctives as the conjunction of two possibility modals, in a manner similar to Zimmermann's (2000) account of the conjunctive interpretation of disjunction: $A \vee B = \Diamond A \wedge \Diamond B$. However, in this case, to explain how some children end up with a conjunctive interpretation of disjunction, we would need to assume further strengthening of each possibility modal to necessity separately (see Deal, 2011; Jeretič, 2021), followed by their conjunction: $\Box A \wedge \Box B$.[13] Finally, it is also possible that children simply ignore the subjunctive marker, treating the irrealis as realis, in line with evidence from the acquisition literature (Tulling & Cournane, 2022). It is quite difficult to tease these explanations apart, but, importantly, they all share one essential and appealing assumption of this approach: that conjunctive children prefer a one-to-one mapping between form and meaning (Slobin, 1973), that is, they associate *fie* with a unique meaning in all contexts (see Bleotu et al., 2024a, for a more elaborate discussion of this proposal).

While the ambiguity account, the conjunctive default account, and the subjunctive syncretism account all offer explanations for the presence of conjunctive responses among children with *fie…fie*, one important finding appears to be better captured by the ambiguity account. Interestingly, while in Experiment 1 half of the children were conjunctive, and half were inclusive with *fie…fie*, children were more inclusive with this disjunction in Experiment 3, compared with Experiments 1 and 2. This increase in inclusive interpretations could suggest that the presence of the explicit question containing conjunction makes the conjunctive interpretation of *fie…fie* less likely by way of contrast. If children abide by Clark's (1987) Principle of Contrast, according to which any difference in form marks a difference in meaning, they could reason that, when faced with a conjunctive question, if the puppet meant to give a conjunctive answer, they would have used conjunction instead. Thus, *fie…fie* must have been used with a different meaning here, namely, that of inclusive disjunction (which would correspond to one of the basic meanings of *fie…fie* under an ambiguity approach). The reason why this does not happen with the *sau*-based disjunctions would simply be that they are not ambiguous between an inclusive disjunction and conjunction, but instead have a logical core meaning of inclusive

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[13]There is an important difference between the theoretical proposal of Zimmermann (2000) and our acquisition proposal. Zimmermann (2000) assumes that any disjunction is decomposed as the conjunction of two modals. However, assuming that children decompose all disjunctions in this manner would be problematic in terms of accounting for the Romanian data, given that it would not be able to explain why we find conjunctive interpretations only for *fie…fie* but not for the *sau*-based disjunctions. Instead, our current acquisition results might suggest that this decomposition is motivated by morphological syncretism with the subjunctive and that it does not characterize all disjunctions.

disjunction, which gets strengthened in the presence of a relevant conjunctive question. Additionally, this account can explain why we failed to see an effect in Experiment 2, in which there was a conjunctive alternative, but it was not immediately contrasted with the disjunctive form. Notably, neither the conjunctive default account nor the subjunctive syncretism account can explain why children access more inclusive interpretations for *fie…fie* in Experiment 3 than in Experiments 1 and 2.

## 6. Conclusion

Our study shows that access to alternatives and contextual relevance introduced through an explicit question together boost exclusivity implicatures. Hearing conjunctive state-ments is not enough if they are not used in the same situation that the disjunctive statements are. Instead, our findings support accounts on which the relevance of the scalar alternative also plays a role: children do not generate implicatures automatically, rather contrast and reference to the same situation seem to play a critical role. Moreover, the effect of access to alternatives and explicit contextual relevance on implicature rates seems to vary with the disjunctions available in a language: while we see an exclusive effect with marked *sau* and *sau…sau*, children become more inclusive with *fie…fie*. We have accounted for this puzzle by arguing that these disjunctions differ in terms of their core semantics: while the *sau*-based disjunctions are (for most children) inclusive disjunctions at their core, which get strengthened to an exclusive interpretation in the presence of explicitly provided, contextually relevant alternatives, *fie…fie* is ambiguous between a conjunctive meaning and an inclusive disjunctive meaning, and inclusive meanings tend to increase when children are exposed to relevant conjunctive utterances.

**Competing interests.** The authors have no competing interests to declare.

**Ethical standard.** Data collection was approved by the Research Ethics Committee in Bucharest (89/20.03.2023).

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