On the conjunctive interpretation of the disjunction *fie…fie* in child Romanian[1]

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Abstract. Previous studies show that adults tend to interpret sentences involving unembedded complex disjunctions (*The mouse carried either the apple or the orange*) exclusively ('The mouse carried one or the other but not both'), while children tend to interpret them either inclusively ('The mouse carried one and possibly both') or conjunctively ('The mouse carried both') (Paris 1973; Braine and Rumain 1981; Chierchia et al. 2001; Guasti et al. 2005; Singh et al. 2016; Nicolae and Sauerland 2016; Tieu et al. 2017; among others). We conducted a set of experiments investigating children's and adults' interpretations of different kinds of simple and complex disjunctions in Romanian, with the goal of probing whether children's conjunctive interpretation of disjunction is an experimental artifact, as argued by Huang and Crain (2020) and Skordos et al. (2020). Specifically, we investigated whether contexts where the disjunctive statement exhaustively mentions all objects in the display are more likely to elicit the conjunctive interpretation. While the majority of the disjunction types were interpreted inclusively by children, there was one disjunction that appeared to differ from the rest: the complex disjunction *fie…fie*, which children tended to interpret conjunctively, whether there were two or four objects in the context. In this paper, we focus on this particular finding, and discuss possible sources of children's conjunctive interpretations: (i) a derived meaning via an implicature within an alternatives-based account, (ii) a primary meaning alongside inclusivity, (iii) syncretism with the present subjunctive of the verb *a fi* ('to be').

Keywords: disjunction, first language, Romanian, conjunctive interpretation, experimental pragmatics, ambiguity, alternatives, subjunctive.

1. Introduction

A disjunctive statement such as (1) can be interpreted in multiple ways: (i) exclusively as 'The mouse carried one but not both', (ii) inclusively as 'The mouse carried one and possibly both,' and (iii) conjunctively as 'The mouse carried both.'

(1)   The mouse carried an apple or an orange.

Previous studies show that adults tend to interpret disjunctions inclusively or exclusively (Chierchia et al. 2001; Guasti et al. 2005; Nicolae and Sauerland 2016; Nicolae et al. 2023), while children interpret them inclusively, exclusively or conjunctively (Paris 1973; Braine and Rumain 1981; Singh et al. 2016; Tieu et al. 2017; Sauerland and Yatsushiro 2018; Huang and Crain 2020; Skordos et al. 2020). While children's inclusive interpretations have been explained as a logical interpretation of disjunction, the source of children's conjunctive interpretations of disjunction has been a matter of debate. According to Singh et al. (2016), the conjunctive interpretation arises as an implicature, with children accessing a different set of alternatives than that of adults. According to Sauerland and Yatsushiro (2018), the conjunctive interpretation corresponds to a basic meaning of disjunction, alongside inclusivity. For Skordos et al. (2020) and Huang and Crain (2020), the reading is an experimental artifact, a repair strategy not grounded in grammar. They argue that conjunctive behavior arises when the disjunctive statement mentions both objects in the display, thus rendering the disjunction either infelicitous as a guess or uninformative in the discourse. In the presence of additional objects, they argue, the disjunctive guess becomes felicitous and informative, and children should no longer give conjunctive responses.

In this paper, we contribute further data to this ongoing debate by discussing one finding from our larger study of disjunctions in Romanian, namely that children appear to interpret the complex disjunction *fie...fie* conjunctively, despite interpreting other simple and complex disjunctions inclusively. Although we focus here on *fie...fie* (given its divergent behavior compared to other disjunctions), the findings of the larger study can be consulted here: `https://osf.io/preprints/psyarxiv/bywj2`.

2. Disjunction in Romanian: On *fie...fie*

Romanian has many commonly used disjunctions: the morphologically simple disjunctions *sau* and *ori*, as well as the morphologically complex disjunctions *sau...sau*, *ori...ori*, and *fie...fie*. Here we highlight the disjunction *fie...fie*, which is interesting in a number of respects. First, it is not as frequent as the complex disjunction *sau...sau*, as shown by a corpus study (see Bleotu et al. 2023 for more details). This may make it more difficult for children to acquire. Second, unlike *sau...sau*, which consists of the reduplication of the simple counterpart *sau* (similarily to Japanese *ka...ka* or French *ou...ou*), *fie...fie* lacks a simple counterpart (making it more similar to the French complex disjunction *soit...soit*). This means that while children might overgeneralize the interpretation of *sau* to the interpretation of *sau...sau*, they are unlikely to do the same in the case of *fie...fie*, since there is no simplex disjunctive counterpart to generalize from. These properties make *fie...fie* an interesting test case for the interpretation of disjunction in child Romanian.

3. The experiments

In the larger study, we conducted two experiments: Experiment 1, involving two objects in each pictured context, and Experiment 2, involving four pictured objects in the context, in order to test whether any observed conjunctive behavior would persist in the presence of additional unmentioned objects in the background. Here we present the experiments in the context of the complex disjunction *fie. . . fie* (but see our manuscript for details pertaining to the other disjunctions).

If the conjunctive interpretation of disjunction is an experimental artifact related to the infelicity of disjunction when there are only two relevant alternatives in the context, then we predicted that any conjunctive interpretations observed in Experiment 1 should disappear in Experiment 2, where the two additional pictured objects should render the disjunctive statement more felicitous (as per the discussion in Skordos et al. 2020 and Huang and Crain 2020).

In Experiment 1, we tested 15 monolingual Romanian-speaking, typically-developing children (age range 4-6 years, mean age 5;03) and 30 adult native speaker controls. In Experiment 2, we tested a different group of 14 Romanian-speaking children (age range 4-6 years, mean age 5;05) and 23 adult controls.

Both experiments employed a Truth Value Judgment Task (Crain and Thornton 1998) presented in Prediction Mode rather than Description Mode (following Tieu et al. 2017 and subsequent work). Such a task licenses ignorance inferences, which often characterize disjunctive statements. Participants had to evaluate whether a puppet called Bibi made correct guesses about the outcome of a situation. The guesses were in the form of disjunctive sentences (see example (2)):

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

The translated scenes in Figure 1 illustrate how trials in Experiment 1 proceeded.

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

Scene 2
Experimenter: Bibi, tell us what happened next.

Bibi: The mouse carried an apple or an orange.

Experimenter: Let's see if Bibi's right!

Scene 3
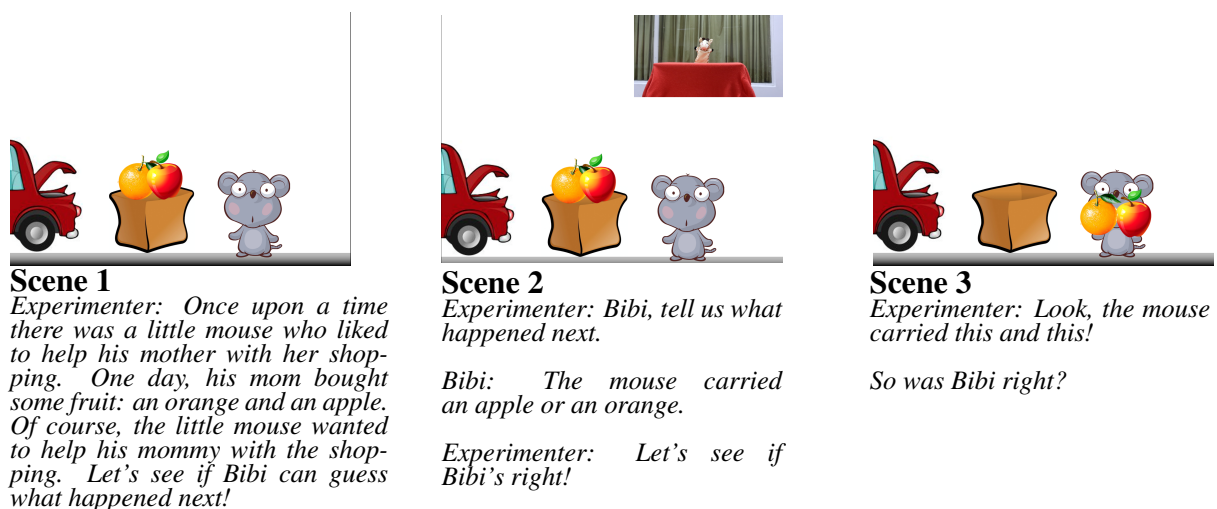*Experimenter: Look, the mouse carried this and this!*

So was Bibi right?

Figure 1: Example of a critical item in the 2DT condition in Experiment 1

The target disjunctive sentences were presented in three kinds of contexts: (i) a 1-disjunct-true (1DT) condition (4 trials), where the situation was true of one disjunct only (for instance, the mouse carried only one fruit), (ii) a 2-disjunct-true (2DT) condition (4 trials), where the situation was true of both disjuncts (for instance, the mouse carried both), and (iii) a 0-disjunct-true (0DT) condition (2 trials), where the situation held of neither disjunct (for instance, an animal carried neither object mentioned in the two disjuncts, but instead carried something else). Note that with the exception of the two 0DT trials where three objects were pictured (one acted upon, two not), all other trials contained only two pictured objects.

While both Experiment 1 ('2 Objects') and Experiment 2 ('4 Objects') tested the same sentences (which mentioned two objects), in Experiment 2, two additional objects were included in each picture, such that each scene now contained a total of four objects. The translated scenes in Figure 2 illustrate how the trials in Experiment 2 proceeded.

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

Scene 2
Experimenter: Bibi, tell us what happened next.

Bibi: The mouse carried an apple or an orange.

Experimenter: Let's see if Bibi's right!

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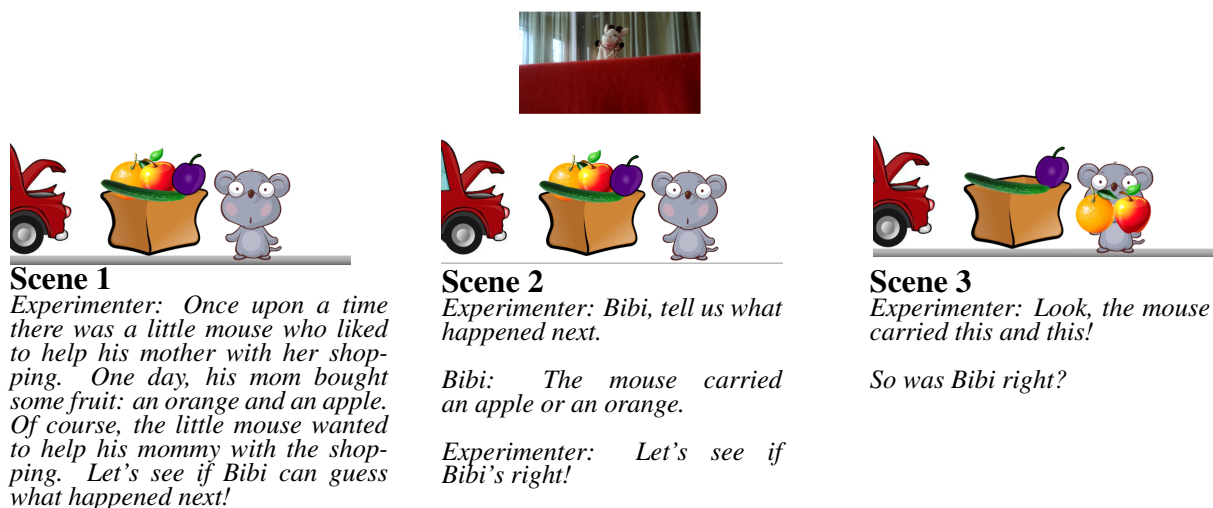
So was Bibi right?

Figure 2: Example of a critical item in the 2DT condition in Experiment 2

We excluded from our planned analyses participants who made errors on more than half of the three fillers and two controls. This led to the exclusion of two child participants (one in Experiment 1, one in Experiment 2); all adults passed the unambiguous controls and fillers. Figure 3 displays the mean rates of acceptance for the critical target conditions.

We used participants' responses to the 1DT and 2DT targets to categorize them as follows: INCLUSIVE if they accepted more than half of the disjunctive utterances in both the 1DT and 2DT conditions, EXCLUSIVE if they accepted more than half of the disjunctive utterances in the 1DT condition, while rejecting more than half of the disjunctive utterances in the 2DT condition, and CONJUNCTIVE if they rejected more than half of the disjunctive utterances in the 1DT condition, while accepting more than half of the disjunctive utterances in the 2DT condition. CONTRADICTORY participants were those who rejected more than half of the disjunctive utterances in both the 1DT and 2DT conditions, and MIXED participants accepted exactly half of the disjunctive statements in each of the two conditions. Table 1 schematizes this categorization; Table 2 provides the numbers of participants falling within each category.

In Experiment 1, adults were mostly exclusive with *fie. . . fie*, while children were mostly con-

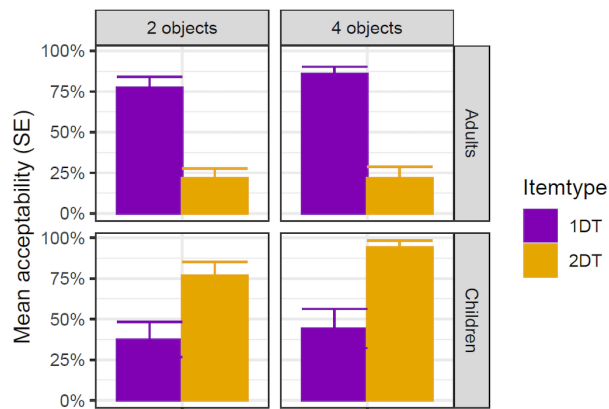On the conjunctive interpretation of the disjunction *fie...fie* in child Romanian

Figure 3: Mean rates of acceptance of *fie...fie* in target conditions

	1DT	2DT
INCLUSIVE	accept	accept
EXCLUSIVE	accept	reject
CONJUNCTIVE	reject	accept
CONTRADICTORY	reject	reject

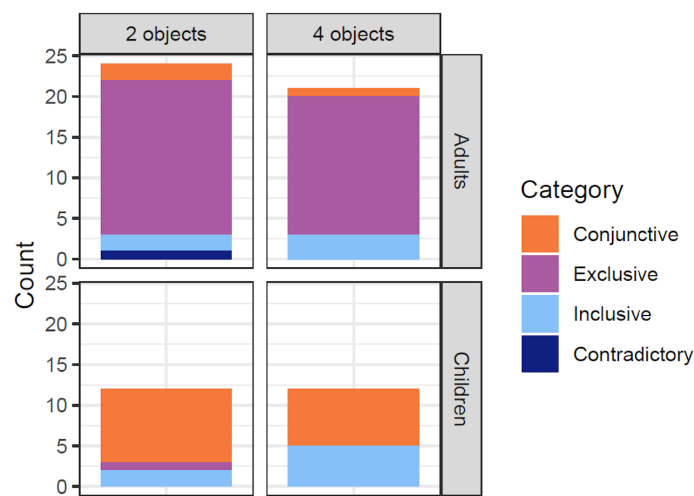Table 1: Possible participant types by interpretation

Figure 4: Distribution of participants across different interpretation types

junctive. In contrast, in Experiment 2, while adults remained exclusive, we observed more inclusive interpretations by children, as shown in Figure 4.

Interested readers can consult our larger paper for the statistical analysis of the full dataset, including *fie...fie*. Descriptively, we found that adults were exclusive with all disjunctions except for neutral *sau* in Experiment 2, which elicited more inclusive interpretations. In contrast, children were mostly inclusive with all *sau*-based disjunctions in both experiments. For *fie...fie*, however, they were mostly conjunctive in Experiment 1, while showing a mix of conjunctive and inclusive interpretations in Experiment 2.

	Inclusive		Conjunctive		Exclusive		Contradictory		Mixed	
	exp 1	exp 2	exp 1	exp 2	exp 1	exp 2	exp 1	exp 2	exp 1	exp 2
children	2	5	9	7	1	0	0	0	2	1
adults	2	3	2	1	19	17	1	0	6	2

Table 2: Numbers of participants falling into each interpretation category (total numbers of participants: Exp. 1 – 15 children, 30 adults; Exp. 2 – 13 children, 23 adults)

Our study reveals two main findings about *fie…fie*. On the one hand, the design of the materials seems to play a role in children's conjunctive interpretations of disjunction: children indeed became more inclusive and less conjunctive in Experiment 2 ('4 Objects'). On the other hand, the fact that the conjunctive interpretation of *fie…fie* persisted even in the presence of additional objects suggests that the presence of conjunctive interpretations cannot be wholly explained as a task effect.

4. Discussion

The results for *fie…fie* indicate that conjunctive interpretations cannot be wholly explained as an experimental artifact. We take the findings to suggest that there is some genuine semantic-pragmatic interpretation leading children to give conjunctive responses. In this section, we discuss three possible sources for the conjunctive interpretation of *fie…fie*, framing the possibilities within: the Alternatives-based Approach, the Ambiguity-Conjunctive Default Approach, and the Subjunctive Account.

4.1. The Alternatives-based Approach

The Alternatives-based Approach takes the conjunctive interpretation to be derived in the grammar (Singh et al. 2016; Tieu et al. 2017). Like adults, children take disjunctions to be inclusive at their core, and enrich meaning by negating relevant alternatives. Unlike adults, however, children do not consider conjunction to be a relevant alternative. Adults and children access different alternatives to *fie A fie B* statements. Adults access the set of alternatives {A, B, A & B}, of which only the conjunction can be negated. The negation of the conjunctive alternative leads to the exclusive interpretation. In contrast, children access the set of alternatives {only A, only B}, the negation of which leads to the conjunctive interpretation.

Given that we appear to have two subgroups of children in Experiment 2, we can extend the alternatives-based analysis by positing a difference among individual children. For some children, the alternatives considered for *fie A, fie B* are {only A, only B}, the negation of which results in the conjunctive interpretation. Other children, however, remain inclusive, choosing not to exhaustify.

A key aspect of this proposal is that the inclusive meaning is the semantic default, while the conjunctive meaning is derived pragmatically.

4.2. The Ambiguity-Conjunctive Default Approach

According to an ambiguity-based account (in the spirit of Sauerland and Yatsushiro 2018), *fie...fie* is ambiguous; some children might therefore entertain an inclusive reading and others a conjunctive reading. The Ambiguity Approach is thus also able to capture the fact that some children were inclusive while others were conjunctive. The conjunctive meaning would simply be taken as one of the possible basic meanings of disjunction, alongside inclusivity.

The low frequency of *fie...fie* could mean that (some) children do not know if this construction is meant to convey a conjunctive or a disjunctive meaning. For this reason, some children may assign a conjunctive interpretation. This possibility is supported by evidence from studies suggesting that children access conjunctive readings by default for other structures as well, for instance, in complex recursive constructions. Children have been found to sometimes interpret *small big flowers* as 'small and big flowers' instead of 'the subset of small flowers among the set of big flowers' (Roeper 2011; Bleotu and Roeper 2021). The idea of a conjunctive default is also supported by data in Bleotu et al. (2024), who report that when Romanian adults were tested on a variant of Experiment 1 in which disjunctive utterances contained the unknown nonce disjunction *mo...mo*, they defaulted to a conjunctive interpretation. Thus, the children who appear to interpret *fie...fie* conjunctively may do so by virtue of a conjunctive default.

4.3. The Subjunctive Account

Finally, another possible explanation for children's conjunctive interpretation of *fie...fie* is based on the syncretism between the disjunctive marker *fie* and the present subjunctive of the verb *a fi* 'to be', which is rather frequently used in Romanian.[2] The subjunctive is a dependent mood, and its modal force and flavor depend on the embedding element (Quer 1998). It can have existential (possibility) force if embedded under the possibility modal *poate* (see example (3)), or universal (necessity) force if embedded under the strong intensional verb *vrea* (see example (4)) (Farkas 1984; Giorgi and Pianesi 1997; Cotfas 2017).

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

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

If children generalize the meaning of subjunctive *fie* and treat the construction *fie...fie* as the juxtaposition of two subjunctives, this may lead to different interpretive paths. One such path involves children analyzing the juxtaposition of the subjunctives as the conjunction of two modals, similarly to how Zimmermann (2000) accounts for conjunctive interpretations of disjunction. In essence, *'be it A, be it B'* would be interpreted along the lines of *Modal A and Modal B*, where *Modal* could correspond to either possibility or necessity. If the modal en-

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[2]The French complex disjunction *soit...soit* is similarly related to the subjunctive form (*soit*) of the verb *être* 'to be.'

codes necessity, this gives rise to the conjunctive interpretation, whereas if the modal encodes possibility, children might subsequently pragmatically strengthen it, going from a possibility meaning to a necessity meaning (Deal 2011; Jeretič 2021).

Another interpretive path involves children simplifying the structure, ignoring *fie*, and thus ending up with *A & B*.

The idea that children might experience difficulties with the subjunctive is supported by recent corpus studies showing that children sometimes treat irrealis as realis (Tulling and Cournane 2022), denying the counterfactual, as in (5), for instance, or using the subjunctive for real facts, as in (6):

(5)   Adult: What if you were a snake?   (Reilly 1982: 116, ex. 57)
        Janine (3;0): I'm not a snake. / I'm Janine.

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

Moreover, while some studies suggest that children are able to handle the subjunctive by the age of four (Riggs et al. 1998; Nyhout et al. 2019), other experimental studies (McCormack et al. 2013; Nyhout et al. 2019; Rafetseder et al. 2013) argue that counterfactual reasoning is not in place until age 6. There are thus reasons to believe that if Romanian 5-year-olds do treat *fie…fie* as the juxtaposition of two *be* subjunctives, they might struggle with its interpretation.

5. Conclusion

Our experimental study revealed evidence of both inclusive and conjunctive interpretations of the complex disjunction *fie…fie* in child Romanian. We have discussed a number of ways these results could be interpreted. In particular, the experimental data on *fie…fie* are compatible with (at least) three possible approaches: the Alternatives-based Approach, the Ambiguity-Conjunctive Default Approach, and the Subjunctive Account. The conjunctive interpretation could be derived through an implicature, through a conjunctive default, or on the basis of the syncretism with the present subjunctive of the verb *a fi* 'to be'. It is also conceivable that the conjunctive interpretation of *fie…fie* has multiple sources, rather than a single one. We aim to address this matter further in future studies.

In closing, our research suggests that the conjunctive interpretation is not always a task effect, challenging the claims in Huang and Crain (2020) and Skordos et al. (2020) that conjunctive interpretations arise as an experimental artifact. The present research also highlights the need for more fine-grained cross-linguistic investigations of disjunction, as the findings suggest that different disjunction types may exhibit different acquisition paths across languages.

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