A nonce investigation of a possible conjunctive default for disjunction

Adina Camelia Bleotu, Andreea Nicolae, Mara Panaitescu,
Gabriela Bîlbîie, Anton Benz, & Lyn Tieu*

Abstract. Our study explores whether there is a conjunctive default in the interpretation of disjunction, focusing on Romanian children's and adults' understanding of nonce functional words. We investigate how participants interpret novel connectors such as *mo* and *mo...mo*, which could theoretically correspond to '(both) A and B', '(either) A or B', or 'A not B' / 'neither A nor B'. Our results reveal that both adults and children overwhelmingly assign a conjunctive meaning to these nonce words. This suggests the existence of a conjunctive default in interpreting unknown operators linking two elements, which could explain why children have sometimes been found to interpret disjunctions as conjunctions in previous studies (Singh et al. 2016, Tieu et al. 2017, Bleotu et al. 2023). In particular, we discuss how this conjunctive default may influence Romanian children's interpretation of complex disjunctions such as *fie...fie*, potentially explaining why they treat these constructions conjunctively. Importantly, our findings also raise broader questions about why certain logical interpretations are favored over others, and whether frequency or cognitive simplicity can drive such biases.

Keywords. conjunction; conjunctive default; disjunction; nonce words

1. Main contribution. The current study explores whether Romanian-speaking children and adults have a default preference for conjunctive interpretations when encountering two items A and B linked by an unknown operator. We connect these results to an explanation of why children sometimes interpret disjunction as conjunction. Specifically, we examine what meaning Romanian children and adults ascribe to novel functional words such as the single connector *mo* and the complex connector *mo...mo* (involving reduplication of *mo*) in the structures *A mo B* and *mo A mo B*.

Based on the distributional properties of Romanian, in particular, the distribution of simple coordination, simple disjunction, and simple negation linking two nominals, possible interpretations of *A mo B* include the following:

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- Conjunctive reading: *A și B* ('A and B')
- Disjunctive reading: *A sau B* ('A or B')
- Negative reading: *A nu B* ('A not B')

Based on the distributional properties of correlative coordination, complex disjunction, and correlative negation linking two nominals, possible interpretations of *mo A mo B* include the following:

- Conjunctive reading: *și A și B* 'both A and B'
- Disjunctive reading: *sau A sau B* 'either A or B'
- Negative reading: *nici A nici B* 'neither A nor B'

Interestingly, while various interpretations seem to be allowed distributionally, our findings suggest that, when participants are exposed to sequences containing a connective that is unknown to them, they tend to favor a conjunctive interpretation over a disjunctive or negative one; that is, the conjunctive interpretation has a privileged status compared to the other possible interpretations.

2. Disjunction in child and adult language. Disjunctive statements may receive multiple interpretations. For example, a sentence like *X acted upon objects A or B* may be interpreted inclusively (such that X acted upon one object and possibly both A and B), exclusively (such that X acted upon one object, not both), and even conjunctively (such that X acted upon both objects, not just one). Interestingly, while the inclusive interpretation is available to both children and adults, the exclusive interpretation is preferred by adults for both simple and complex disjunctions (Nicolae & Sauerland 2016, Nicolae et al. 2024), while it is relatively rare in children (though see Sauerland & Yatsushiro 2018 for evidence that German children can be exclusive). The conjunctive interpretation, on the other hand, is specific to child language (Singh et al. 2016, Tieu et al. 2017, Bleotu et al. 2023), but is absent from adult language. Table 1 illustrates the available interpretations of disjunction in child and adult language for a sentence such as (1).

(1) The hen pushed the train **or** the boat.

Interpretation	Paraphrase	Adults	Children
Inclusive	The hen pushed one and possibly both.	✓	✓
Exclusive	The hen pushed only one, not both.	✓	?
Conjunctive	The hen pushed both, not just one.	✗	✓

Table 1: Possible interpretations of the disjunctive sentence *The hen pushed the train or the boat* in adults and children

The inclusive interpretation of disjunction can be explained as a logical, literal interpretation of disjunction (Noveck 2001), while the exclusive interpretation can be derived via the negation of the stronger conjunctive alternative *A and B* (Grice 1975, 1989). The more controversial interpretation to explain is children's conjunctive interpretation of disjunction. For this, different accounts have been proposed, which derive the reading as: (i) an implicature involving recursive exhaustification (Singh et al. 2016, Tieu et al. 2017),[1] (ii) a basic meaning of disjunction alongside

[1]According to Singh et al. (2016), the conjunctive interpretation is derived through recursive exhaustification as follows: first, children enrich the simple disjunct alternatives (yielding *The hen only pushed the train*, *The hen only*

inclusivity, according to the ambiguity approach (Sauerland & Yatsushiro 2018), and (iii) a mere experimental artifact arising when disjunctive statements exhaustively mention all of the objects that the character interacts or may interact with (Skordos et al. 2020, Huang & Crain 2020). Of particular interest to us is the second possibility, namely that in child language, disjunction may initially (also) have a conjunctive meaning, possibly by virtue of a conjunctive default which children fall back on when having to interpret more complex items/structures (such as disjunctive ones).

3. Disjunction in child Romanian. In an adapted version of Tieu et al. (2017), Bleotu et al. (2023) and Bleotu et al. (2024c) examined the interpretation of disjunction in child and adult Romanian. In order to test whether the conjunctive interpretation of disjunction is a mere experimental artifact rather than a genuine semantic or pragmatic interpretation, the authors compared cases where the pictured agent (corresponding to the sentential subject) was surrounded by two objects and the disjunctive statements mentioned both, with cases where the agent was surrounded by four objects and the disjunctive statements mentioned only two of these (see Figure 1). Given the abundance of disjunctive markers in Romanian, the authors tested four different markers. Two involved variants of the simplex disjunction *sau*: (i) *sau* with neutral prosody, where there is no prosodic boundary after the first disjunct, (ii) *sau* with marked prosody, where each disjunct receives stress, similar to the pattern seen in complex disjunctions. The other markers were complex disjunctions: (iii) *sau...sau*, which is a reduplicated form of the simple *sau*, comparable to the Japanese *ka...ka* and *ka* or the French *ou...ou* and *ou*, and (iv) *fie...fie*, which has no simplex counterpart, much like the French disjunctions *soit...soit* versus *ou*.

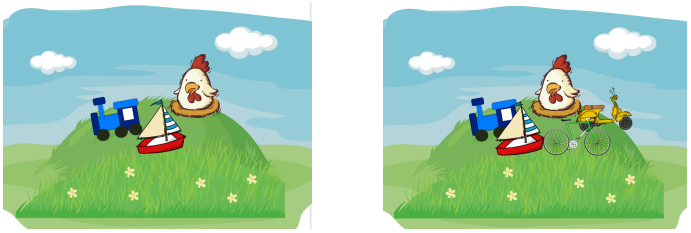

Figure 1: Examples of 2-object and 4-object displays for the sentence *The hen pushed the train or the boat*, from Bleotu et al. (2024c)

The results revealed that Romanian 5-year-olds showed a consistent tendency to interpret all forms of *sau*-based disjunctions inclusively. However, for the complex disjunction *fie...fie*, there was evidence of both conjunctive and inclusive readings. Furthermore, while a significant decrease in the conjunctive interpretation of *fie...fie* was found in the experimental set-up that involved four rather than two objects, overall, the conjunctive interpretation of *fie...fie* did not fully go away, remaining an available interpretation for children. This led Bleotu et al. (2024c) to conclude that

pushed the boat); they then exhaustify the disjunctive sentence with respect to these pre-exhaustified alternatives. This effectively amounts to a conjunctive interpretation: the hen pushed the train or the boat, but it is false that the hen only pushed the train, and it is false that the hen only pushed the boat. It is worth noting that this recursive exhaustification mechanism has been independently invoked to account for the derivation of free choice inferences associated with modalized disjunctive statements, such as *You may push the train or the boat*, in both adults and children (see, among many others, Kratzer & Shimoyama 2002 and Fox 2007, as well as Chemla & Bott 2014 and Tieu et al. 2016 for experimental evidence).

children's conjunctive interpretation of disjunction is not a mere experimental artifact but a genuine linguistic interpretation. The current study further extends this investigation, asking whether children's conjunctive interpretation of disjunction might be due to a conjunctive semantic default.

4. Nonce paradigms. The investigation relies on nonce words as a method to probe into children's syntactic bootstrapping, that is, their ability to interpret words by relying on syntactic cues (Gleitman 1990, Brown 1957). For instance, by relying on distributional information, children are able to differentiate nonce nouns (*Do you see a sib? / Do you see any sib?*) from nonce verbs (*What is sibbing?*). Berko (1958)'s Wug Test brought further evidence that children extend known morphology to novel words, such as plural forms (*one wug* vs. *two wugs*) and verbal morphology (*He zibs*). Many subsequent experiments followed, including Naigles (1990), Syrett & Lidz (2010), Yuan & Fisher (2009), Yuan et al. (2011, 2012), Huang et al. (2021) among others, further supporting these findings.

Recent novel paradigms also investigate the existence of logical defaults in interpretation, for example, the Human Simulation Paradigm (HSP; Gillette et al. 1999), which tests whether adults can infer meaning from context (see Dieuleveut et al. 2022 for application of this paradigm to modals) and artificial language learning paradigms (Culbertson & Schuler 2019, Maldonado & Culbertson 2021, 2022), which are used to investigate adults' and children's biases in learning artificial words.

In this study, we will take the natural step of extending nonce paradigms to explore children's and adults' defaults in ascribing meaning to unknown logical operators.

5. Experiments.

5.1. AIM. In our study, we investigate the kinds of meanings children and adults ascribe to a sequence where two nouns are linked by nonce words. If there is a conjunctive default, we hypothesized that participants would default to interpreting the nonce connective as a conjunction.

5.2. PROCEDURE. We conducted a ***mo*** Experiment, where A and B were linked by the nonce word *mo* (cf. *A mo B*), as well as a ***mo...mo*** Experiment, where A and B were each preceded by the nonce word *mo* (cf. *mo A...mo B*), mimicking a complex connective. The two tasks we conducted employed a Truth Value Judgment Task in Prediction Mode (Tieu et al. 2017) rather than Description Mode (Singh et al. 2016), so as to license ignorance inferences, which often characterize disjunctive statements. Participants were asked to evaluate whether a puppet named Bibi correctly guessed the outcome of a situation. Participants were told that Bibi would sometimes make use of an unknown word, and they had to decide what it meant for Bibi. They were also told that the unknown word does not refer to something that one can point to. Participants had to say whether Bibi guessed well. At the end of the experiments, participants had to say what they thought the nonce words meant.

Guesses took the form exemplified in (2) in the *mo* task and the form exemplified in (3) in the *mo...mo* task, and they were provided orally to participants. Each trial involved three scenes, as shown in Figure 2.

(2) Găina a împins trenul **mo** barca.
hen.DEF has pushed train.DEF mo boat.DEF
'The hen pushed the train mo the boat.'

(3) Găina a împins **mo** trenul **mo** barca.
hen.DEF has pushed mo train.DEF mo boat.DEF
'The hen pushed mo the train mo the boat.'

Scene 1 Experimenter: 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 *a train, a boat*. The hen was very happy to play with them. Let's see if Bibi can guess what happened next!
Scene 2 Experimenter: Bibi, tell us what happened next.
Bibi: The hen pushed the train mo the boat. (*mo* task)
Bibi: The hen pushed mo the train mo the boat. (*mo...mo* task)
Experimenter: Let's see if Bibi's right!
Scene 3 Experimenter: Look, the mouse carried this and this! So was Bibi right?

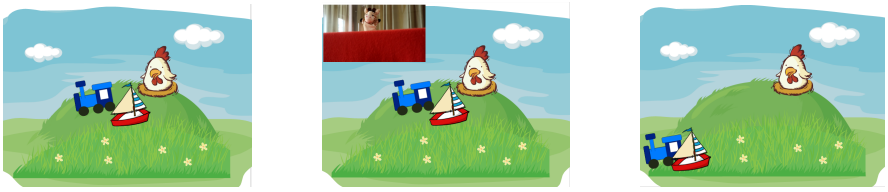

Figure 2: The three scenes of an experimental trial in which the guess *The hen pushed (mo) the train mo the boat* was uttered in a 2-disjunct-true (2DT) context

5.3. MATERIALS. The test was preceded by two warm-up trials (one true, one false), consisting of a simple noun subject, a verb and a simple noun object, such as (4). The presence of warm-up items ensured that participants were familiarized with the procedure. These trials only contained words known to children, and crucially did not contain *mo* or *mo...mo*.

(4) Buburuza a pictat cana.
ladybug.DEF has painted mug.DEF
'The ladybug painted the mug.'

Our test items involved four 1-disjunct-true (1DT) target trials (e.g., only the train was pushed), four 2-disjunct-true (2DT) target trials (e.g., both the train and the boat were pushed), and two 0-disjunct-true (0DT) control trials (e.g., neither of the objects mentioned was pushed, but a different object was pushed).[2] We also included three (true/false) fillers consisting of a simple noun subject, a verb, and a simple noun object, such as (5).

(5) Iepurașul a cules o pară.
bunny.DEF has picked a pear
'The bunny picked a pear.'

We avoided the use of logical operators such as conjunction, negation, or disjunction throughout

[2]As discussed in Jasbi et al. (2018, 2022) and in recent work by Bleotu et al. (2024b), children may have a tendency to produce more disjunctions and be more exclusive when A and B are incompatible with each other, e.g., *The squirrel was either at the top or at the bottom of the tree*, compared to when A and B are in principle mutually compatible. In this study, we restricted ourselves to situations where A and B are in principle mutually compatible, rather than mutually incompatible.

the experiment so as to avoid priming participants in any way. In a previous study, Bleotu et al. (2024a) showed that in the presence of relevant questions involving the conjunctive alternative (*Did the hen push the train and the boat?*), children were more exclusive for *sau*-based disjunctions and more inclusive for *fie...fie*. Based on these findings, we wanted to make sure that participants' interpretation of the nonce words was not influenced by questions that included conjunctions or other logical operators.

For the warm-up items and for the control items, the visual display showed the subject and three objects (only one of these was mentioned in the warm-up sentences, only two of these were mentioned in the 0DT disjunctive sentences). For the 1DT and 2DT targets, the visuals only included the subject doing the action and the two objects mentioned in the disjunctive utterances, with no additional objects pictured.

5.4. PARTICIPANTS. 17 monolingual Romanian-speaking children (3;06—5;11) and 21 Romanian adult native speaker controls participated in the experiments. All participants first completed the *mo* task, followed by the *mo...mo* task two weeks later.

5.5. PREDICTION. If there exists a conjunctive default for the interpretation of logical operators, we expect participants to interpret both *mo* and *mo...mo* conjunctively, in line with this default.

5.6. RESULTS. All participants passed the controls and fillers and were included in the analysis; overall accuracy was high on both fillers (95.15%) and controls (95.24%). We first analyzed the group data, focusing on responses to the 1DT condition. If participants showed a conjunctive preference, they should reject the 1DT targets, since only one of the disjuncts/conjuncts was verified; on the other hand, accepting 1DT targets would be consistent with either inclusive or exclusive interpretations. We fit a mixed effects logistic regression model in R (R Core Team 2021) to responses to the 1DT condition, with answer as a dependent variable (coded as 1 for *yes*, 0 for *no*), Group (Children vs. Adults), Disjunction type (*mo* vs. *mo...mo*) and their interaction as fixed effects, and random intercepts for Participant and Item. The model revealed a significant effect of Disjunction ($\beta = -0.89$, *SE* = 0.42, *Z* = -2.1, $p < .05$) but no significant effect of Group or interaction (both $p > .05$).

Next, we analyzed individual participants' response patterns. Based on their responses to the 1DT and 2DT targets, we categorized participants as: inclusive, exclusive, negative, conjunctive, or mixed. Table 2 shows the expected pattern of responses for each category of interpretation in the *mo* task, while Table 3 shows the expected response patterns in the *mo...mo* task.

Interpretation of *'A mo B'*	1DT	2DT
INCLUSIVE	Yes	Yes
EXCLUSIVE	Yes	No
NEGATIVE	Yes (if A is true and B is false)	No
CONJUNCTIVE	No	Yes

Table 2: Expected response patterns for 1DT and 2DT conditions in the *mo* task

As shown in Table 4, both children and adults preferred conjunctive interpretations of both *mo* and *mo...mo*. Given the overall small numbers of participants, we conducted a Fisher's Exact Test to determine if children and adults differed in their distribution of interpretation types. We found

Interpretation of *'mo A mo B'*	1DT	2DT
INCLUSIVE	Yes	Yes
EXCLUSIVE	Yes	No
NEGATIVE	No	No
CONJUNCTIVE	No	Yes

Table 3: Expected response patterns for 1DT and 2DT conditions in the *mo...mo* task

no difference between groups ($p > .05$); children and adults were equally conjunctive in their responses. We conducted an additional Fisher's Exact Test to compare the distribution of child responder types for *mo* and *mo...mo*: there were 12 conjunctive children and 5 non-conjunctive children in the *mo* task and 16 conjunctive children and 1 non-conjunctive child in the *mo...mo* task. The analysis revealed no significant association between the type of nonce operator and the observed number of conjunctive responders in children ($p = 0.17$, OR $= 0.16$, 95% CI: $0.003 - 1.7$). Lastly, we also conducted the Fisher's Exact Test to compare responses for *mo* and *mo...mo* among adults: there were 13 conjunctive adults and 7 non-conjunctive adults for *mo* and 16 conjunctive adults and 4 non-conjunctive adults for *mo...mo*. The analysis revealed no significant association between the type of nonce operator and conjunctive responders in adults ($p = 0.48$, OR $= 0.47$, 95% CI: $0.082 - 2.4$).

Group	**Interpretation**	***mo***	***mo...mo***
Children (n=17)	Conjunctive	12	16
	Negative	1	0
	Mixed	4	1
Adults (n=20)	Conjunctive	13	16
	Negative	2	2
	Mixed	5	2

Table 4: Distribution of participants by interpretation in the *mo* and *mo...mo* tasks and

6. Discussion. When adults and children are exposed to nonce words connecting A and B, their default interpretation seems to be conjunctive. Even more strikingly, they seem to default to conjunction even in an experiment where Bibi does not always make correct guesses, as evidenced by the fact that some of the fillers were true, while some were false. In the remainder of the paper we discuss some possible interpretations of the results: a processing approach, a frequency approach, a logical universal primitives approach, and variants of a strongest meaning preference approach.

A processing approach According to a processing account, participants' conjunctive preference could be due to a simplified processing of the *A mo B* and *mo A mo B* structures, leading them to disregard the unknown operators and interpret them as the mere juxtaposition of A and B. Importantly, note that juxtaposing A and B leads to a conjunctive interpretation (Winter 1995). Thus, an utterance such as *The hen pushed (mo) the train mo the boat* may be understood as 'The hen pushed the train, the boat', and in turn as 'The hen pushed the train and the boat'. Under this approach, *mo* and *mo...mo* are essentially ignored.

There are, however, other approaches which assume that participants do not necessarily ignore the nonce operators but instead that they attribute meanings to them on the basis of frequency, of logical primitives, or due to a bias for strong meanings.

A frequency approach One could consider a frequency-based approach, which takes into account the frequency of various interpretations (e.g., conjunctive/disjunctive). On such an approach, participants may simply associate the unknown connector(s) with the interpretation corresponding to the most frequent logical operator linking two elements, namely conjunction. Such a view would be supported by corpus evidence from Jasbi et al. (2018, 2022) that conjunction is more frequent than disjunction.

A logical universal primitives approach Yet another view would be to consider logical universal primitives to be more easily accessible than non-primitives, with both children and adults preferring to attribute to the nonce operators the meaning associated with a logical primitive. Under a view which takes conjunction to be more basic than disjunction and conceptually simpler, the fact that both children and adults default to a conjunctive interpretation falls out. One such view is entertained by Zimmermann (2000) and Geurts (2005), according to whom disjunction is more complex and can be decomposed using conjunction. Specifically, they claim that disjunctive interpretations can be analyzed as the conjunction of two modalized elements ($\Diamond A \wedge \Diamond B$).

Strongest Meaning Preference According to a view which privileges strong meanings, it could be that participants opt for conjunction rather than disjunction because conjunction has the stronger meaning of the two (*The hen pushed the train and the boat* entails *The hen pushed the train or the boat*, but the reverse is not true). According to Dalrymple et al. (1998), if a sentence is ambiguous between two meanings, people may prefer the stronger one. Since sentences containing *mo* and *mo...mo* allow for multiple interpretations, we could assume participants observe this principle and choose the stronger meaning of conjunction over disjunction.

In terms of acquisition, these findings are also in line with the *Subset Principle* (Crain et al. 1994, Crain & Thornton 1998), a learnability principle which leads children to prefer stronger (subset) interpretations over weaker (superset) ones. Starting off with stronger conjunctive meanings, children can learn the weaker disjunctive meanings via positive evidence. This would be preferable to a scenario in which children start off with weaker disjunctive meanings and then have to learn the stronger conjunctive meanings via negative evidence (which is known to be scarce).

Distinguishing between the accounts above is not straightforward, given that frequency may be a consequence of conjunction being a default, or a consequence of conjunction having a stronger meaning than disjunction. We consider it an important empirical finding that both children and adults seem to opt for conjunction over disjunction as the meaning of a nonce operator, and suggest that future research can attempt to disentangle the various possible explanations.

Our findings are also important in that they shed light on children's *conjunctive interpretations of disjunction*. Previous studies (see Bleotu et al. 2023) have found that Romanian children are conjunctive and inclusive in their interpretation of the complex disjunction *fie...fie*. While the inclusive interpretation could be explained as a preference for a logical/literal interpretation, one could instead argue that children's conjunctive interpretation of *fie...fie* is due to a conjunctive default, especially if *fie...fie* is perceived as infrequent or less familiar to children (data from adult corpora suggest that *fie...fie* is less frequent than *sau* or *sau...sau*, see Bleotu et al. 2023).

While our findings do not completely rule out the possibility that some children could also arrive at conjunctivity through an implicature, they do suggest that a likelier possibility is that most of the children rely on a conjunctive default when the operators they have to handle are unknown to them or more complex, which would be the case of disjunction, particularly for disjunctions such as *fie...fie*. On this story, the conjunctive meaning of disjunction would not be derived as an implicature but rather it would precede any implicature stage, which is also in line with recent work by Aloni (2024).

7. Conclusion. The nonce experiments presented in the current study suggest that both Romanian-speaking children and adults show a conjunctive default in ascribing meaning to unknown operators linking two linguistic elements. Thus, these findings support the idea that a conjunctive default could be a possible source for children's conjunctive interpretation of disjunction.

8. Future directions. Further research can investigate whether the findings of this study are replicable cross-linguistically, by looking at children's and adults' behavior in languages other than Romanian. Such studies could investigate in what way differences in the distributional properties of conjunction and disjunction may affect the availability of a conjunctive default.

Moreover, it would be important to determine the contribution of the linguistic and visual components of the experiment. An outstanding question is whether our findings might actually reflect an experimental artifact, as argued by Huang & Crain (2020) and Skordos & Papafragou (2016). Our experiment utilized two objects, both of which were explicitly mentioned in the sentences. One could wonder whether the observed preference for conjunction is affected by this particular visual display. To explore this further, future studies should replicate the experiment with four objects, allowing us to better assess the role of the visual component in shaping participants' preferred interpretations.

Finally, further research is needed to investigate other possible sources for the conjunctive interpretation. For instance, we still do not know why, in child Romanian, conjunctive meanings seem to arise mostly with the disjunction *fie...fie*, rather than with *sau*-based forms of disjunction. One possible account relies on the idea that there is syncretism between *fie* and the present subjunctive *fie* of the verb *a fi* 'to be' in Romanian, possibly leading children to interpret *fie...fie* as 'be it A, be it B', and ultimately as '(there is) A and B' by reducing the irrealis 'be' to a realis 'is' (Bleotu et al. 2024c,d). Future studies should further explore this possibility, as the conjunctive interpretation of disjunction could be the effect of various (joint) sources rather than attributable to a single source. It could also be that these sources play different roles at different stages of development, e.g., the conjunctive default could characterize the behavior of young children (say, 3- and 4-year-olds), while errors of syncretism with the subjunctive could be at play in both younger and older children. A clear picture of the sources of the conjunctive interpretation of disjunction remains to be developed.

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