How L2 English Speakers Interpret Disjunction in Negative Sentences

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The present study investigates the interpretation of disjunction in negative sentences, focusing on the cross-linguistic variation between English and Romanian and on the resetting of parameter values by Romanian-speaking learners of English. One experimental study was conducted for each linguistic group, and the results indicated that: 1) English speakers preferred the interpretation according to which disjunction is not understood as a positive polarity item (i.e., the –PPI interpretation), 2) Romanian speakers preferred the interpretation according to which disjunction is understood as a positive polarity item (i.e., the +PPI interpretation), and 3) the majority of English learners were at an interlanguage stage where there was variation between the English-like and Romanian-like preferences. This study contributes to the understanding of cross-linguistic variation in polarity phenomena and of parameter resetting in second-language learning.

Key-words: *second-language learning, polarity items, negation, disjunction*

1. Introduction

The interpretation of the interaction between logical operators has been the subject of extensive investigation in both formal logic and linguistic theory. The interaction between negation and disjunction holds a central position because it reveals cross-linguistic variation that challenges the mapping between logic, consisting here in de Morgan's equivalence rules, and natural languages, in which the preference diverges from the rules of logic.

Along the Lexical Parameter (Szabolcsi 2002; Szabolcsi and Haddican 2004), both English and Romanian range with languages in which negation outscopes disjunction and assigns disjunction a –PPI interpretation. English has been consistently described as a –PPI language, while the status of Romanian remains debated. Thus, the present study is an inquiry into how these two languages encode scope relations between negation and disjunction.

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Moreover, the present study aims to investigate how Romanian-speaking learners of L2 English interpret disjunction in negative sentences and whether their native language influences the interpretation in their second language.

Therefore, this research not only sheds light on the theoretical framework of the Lexical Parameter but also offers a study about the interface between syntactic structure and logical form, cross-linguistic variation, and L2 learning.

2. Disjunction in negative sentences

The interaction between negation and disjunction has long been a subject of interest in formal logic. De Morgan's logical rule, also adapted in formal semantics, formalises the interaction between these two operators as: $\neg (p \vee q) = \neg p \wedge \neg q$. Nevertheless, some natural languages seem to diverge from this rule since they allow and even prefer a different interpretation, namely $\neg (p \vee q) = \neg p \vee \neg q$.

The difference in the behaviour of natural languages has been observed by Szabolcsi (2002) and Szabolcsi and Haddican (2004) and is known as the Lexical or Disjunction Parameter:

> English disjunction (...) happily scopes below a c-commanding negation and dutifully obeys the de Morgan laws, whereas the Hungarian counterparts either must scope above the c-commanding negation or fail to obey the de Morgan laws. Such contrasts are not restricted to English versus Hungarian. Similar to English is German; similar to Hungarian are Russian, Serbian, Italian and Japanese, among other languages. (Szabolcsi and Haddican 2004, 220)

Multiple explanations for cross-linguistic variation arise, ranging from negation as an element able to "reverse the truth-value of its scope" (Szabolcsi 2012, 1606) to the status of disjunction as an element able to escape the scope of negation. If only the first explanation is taken into account, the only possible interpretation of disjunction in negative sentences would be $\neg (p \vee q) = \neg p \wedge \neg q$, characteristic of English-like languages. In these cases, disjunction is part of the scope of negation, mimicking the behaviour of negative polarity items, elements that can be licenced and c-commanded by negation (Neg>NPI). In languages such as English and Romanian, disjunction has an NPI or –PPI parametric value and gives rise to the conjunctive or the "neither" interpretation:

(1) *We didn't close the door or the window.*
conjunctive interpretation: we did not close the door and we did not close the window. (Szabolcsi 2002, 217)

In contrast, the presence of the opposite interpretation, i.e., $\neg (p \lor q) = \neg p \lor \neg q$, indicates that the role disjunction plays in negative sentences is more complex, namely, disjunction can outscope negation. In these cases, disjunction mimics the behaviour of positive polarity items, which must outscope negation to avoid polarity incompatibility when they appear in syntactically negative sentences (PPI>Neg). In languages such as Hungarian, disjunction behaves as a PPI, giving rise to the disjunctive or the "I don't know which" interpretation:

(2) *We didn't close the door or the window.*
disjunctive interpretation: we did not close the door or we did not close the window. (Szabolcsi 2002, 217)

Although Szabolcsi (2002) leaves the reason why one language should be characterised as –PPI or +PPI up for further investigation, one explanation offered is the ability or "inability of the disjunction morpheme to bear stress" (Szabolcsi 2002, 236). Unstressed disjunction in negative sentences creates ambiguity between the conjunctive and disjunctive interpretations, while stressed disjunction disambiguates by indicating the conjunctive interpretation.

In languages in which disjunction can be easily stressed (e.g., English and Romanian), the -PPI interpretation is overgeneralized and preferred by native speakers, although the "I don't know which" interpretation is also possible as a result of the non-stressed disjunction morpheme. In languages in which disjunction cannot be stressed (e.g., Hungarian), the +PPI interpretation is preferred since it is difficult for the –PPI interpretation to naturally appear.

Nevertheless, the theoretical framework of the present study is that, according to the Lexical Parameter (Szabolcsi 2002, Szabolcsi and Haddican 2004), both English and Romanian are considered conjunctive or –PPI languages.

2.1. Literature review

Since the formal introduction of the Disjunction Parameter (Szabolcsi 2002; Szabolcsi and Haddican 2004), an increasing number of experimental studies have been conducted with the view to investigating whether children and adults share the same scopal preference for the interaction between negation and disjunction, and whether adults' preferences differ across languages.

According to the Disjunction Parameter, English is a language in which the preference is for the "neither" interpretation (Szabolcsi 2002; Szabolcsi and Haddican 2004) – negation has wide scope over disjunction. Various studies have investigated the truth of this claim both in children and adults.

Gualmini and Crain (2005) conducted experiments to investigate how English-speaking children interpret clause-mate negation and disjunction. In the first truth-value judgment task, the children preferred the conjunctive or the "neither" interpretation for sentence (3a), while for the second truth-value judgment task, they exhibited a similar interpretation pattern for sentences such as (3b):

(3) a. *The girl who didn't go to sleep will get a dime or a jewel.*
                                              (Gualmini and Crain 2005, 467)
      b. *Winnie the Pooh would not let Eeyore eat the cookie or the cake.*
                                              (Gualmini and Crain 2005, 468)

These results showed that, from a young age, English speakers set the –PPI parametric value for disjunction in negative sentences.

Various studies have been conducted on adult speakers of English. Jasbi et al. (2023) conducted a card selection task with experimental questions such as (4):

(4) a. *Bob selected the card which doesn't have a cat or a dog.*
      b. *Select a card if it doesn't have a cat or a dog.*
      c. *Which card doesn't have a cat or a dog?*
                                              (Jasbi et al. 2023, 133)

The results confirmed that the preferred interpretation of English adult speakers was in accordance with the Disjunction Parameter, since the vast majority of participants preferred the "neither" reading, thus showing that the default interpretation in English is the one in which negation takes scope over disjunction.

Lungu et al. (2021) used an acceptability judgment task to investigate adult English speakers' preferences:

(5)   *Mary didn't invite John or Suzi to the party.*
      a. *It is not the case that Mary invited John, and it is not the case that Mary invited Suzi to the party. NEG > OR*
      b. *It is either John or Suzi that Mary didn't invite to the party. OR > NEG*
                                              (Lungu et al. 2021, 221)

The raw data revealed that the English group exhibited a high acceptability of the narrow-scope continuation, i.e., the conjunctive reading, and a low acceptability of the wide-scope continuation, i.e., the disjunctive reading. This indicates that, although both the conjunctive and the disjunctive readings are available, the conjunctive reading is clearly preferred by native speakers.

In view of the Disjunction Parameter, Romanian patterns with those languages where the "neither" interpretation is preferred (Szabolcsi 2002; Szabolcsi and Haddican 2004) – negation has wide scope over disjunction. To date, a limited number of experimental studies have investigated this claim.

The study by Bleotu et al. (2024) focused on the interpretative preference assigned by Romanian children using a truth-value judgment task with test questions such as (6):

(6)   *Koala did not choose the cake or the salad.* (Bleotu et al. 2024)

The results indicated that more than half of the children group (n = 32) consistently preferred the "neither" interpretation, and more than half of the adult control group (n = 40) preferred the same interpretation, thus confirming the prediction made by the Disjunction Parameter. Nevertheless, the study showed that there is a high level of variation regarding the preferred interpretation in Romanian, as almost half of the participants from the two groups consistently chose the "I don't know which" interpretation.

The other recorded study on the preferred interpretation in Romanian is the study by Lungu et al. (2021), which focused on adults' preferences. It showed that the preference in Romanian is different from the preference in English since the degree of +PPI behaviour in Romanian was significantly higher. Both interpretations were possible in Romanian (also shown by Bleotu et al. 2024), but there was a slightly more pronounced preference for the +PPI or "I don't know which" interpretation. This challenges Szabolcsi's assumption about the –PPI parametric value in Romanian and shows that there is room for further investigation in the domain of syntactic and semantic interactions in Romanian.

Therefore, my own experimental study aims to investigate in a unified manner how adult English and Romanian speakers interpret the interaction between the two logical operators. In case there are differences, as shown by Lungu et al. (2021), the further aim is to investigate how Romanian-speaking learners of L2 English learn the appropriate parametric value in English and whether they have difficulties in resetting their native parametric value.

3. Disjunction in negative sentences in English

The investigation on native English speakers aims to provide an answer to the first research question:

(i) What is the preference of adult native speakers of English with regard to the interaction between negation and disjunction?

The present study was conducted in order to establish a methodological parallel with the other studies on adult native Romanian speakers and Romanian-speaking learners of English, since identical tasks and scenarios were used to ensure that the results were comparable across linguistic groups. In addition, this study was conducted to establish the objective L2 learners of English need to achieve in order to acquire the native-like preference of disjunction in negative sentences.

3.1. Methodology and procedure

As mentioned before, the aim was to analyse the preference of native speakers of English, Romanian and Romanian-speaking learners of English with respect to the behaviour of disjunction in negative sentences. To achieve this, three experimental studies were conducted, one for each linguistic group.

    For all three linguistic groups, the same procedure and tasks were used, translated from English into Romanian. All studies were designed as forced-elicitation-in-context tasks, and they all followed identical scenarios.

    The participants were faced with several scenarios narrated by Bibi, who told them stories about her friends. The need for the narrator was motivated by the fact that the "I don't know which" interpretation can appear only in a context in which the participants are not given enough information and cannot make a precise claim.

    All scenarios included personified animals with Bibi telling a story about those animals and the choices they made when asked to interact with two objects. For example, the animals were asked to put a mushroom and a flower in a basket, but they chose to put either only one object or no object in the basket. At the end of the story, the participants were asked a question about what the animal did, and they were given four answer choices.

    For each linguistic group, the task was split into two experiments so that the time it took participants to answer the task would not exceed 20 minutes. For each experiment, the questions consisted of 2 warm-up questions and 4 filler questions (all identical for the 2 experiments), as well as 8 experimental questions. The experimental questions involved animals such as a chicken, a mouse, a giraffe, a

bear, a cat, a hamster, a monkey and a rabbit. In total, 2 warm-up questions, 4 filler questions and 16 experimental questions were designed.

The experimental questions were categorised into two conditions based on the animal's choice on what to do with the objects:

(i) the *NONE* condition (i.e., the animal decided that it did not want to put the items in the basket);
(ii) the *1DT* condition (i.e., the animal decided that it wanted to put only one item in the basket).

The only difference between the two experiments was that if, in one experiment, one animal decided to put no item in the basket, then the same animal decided to put only one item in the basket in the second experiment. Therefore, there was an alternation between animals and conditions so that participants did not encounter the same animal in one experiment.

At the end of the story, irrespective of the condition tested, the participants were given a question about what the animal did, and they had four answer choices:

A. an answer including the discontinuous conjunction *neither … nor;*
B. an answer containing negation and disjunction;
C. an answer according to which both of the previous choices were correct;
D. an answer according to which the participants did not find an appropriate choice and were given the liberty to write their own preferred reply.

An example of the *NONE* condition is:

(7)   *Bibi tells us a story:*
        One day, I was in the forest with Vivi. A bear who is friends with Vivi saw us and came to us. Vivi picked a mushroom, a flower. Vivi asked the bear to put them in a basket while she went to the river. Then, Vivi left.
        While Vivi was at the river, the bear decided that he didn't want to put the items in the basket.
        Vivi returns, but she doesn't know what happened. Let's help Vivi understand what happened. Vivi asks us:
   A. *No, he put neither the mushroom nor the flower in the basket.*
   B. *No, he didn't put the mushroom or the flower in the basket.*
   C. *Both answers*
   D. *Another answer: ……………………………………………………………..*

For this condition, answer A indicated that the participants preferred the use of the discontinuous conjunction *neither … nor* in scenarios in which both determiners were negated (i.e., the disjunctive reading of disjunction in negative sentences). Answer B indicated the preference for the use of disjunction and negation in scenarios in which both determiners were negated (i.e., the conjunctive reading or the "neither" interpretation). Answer C indicated that both choices were used by native speakers, and it was considered a preference for the conjunctive reading since the use of *neg … or* was also considered acceptable. Answer D indicated that participants preferred another answer choice, usually a shorter and more straightforward one.

An example of the *1DT* condition is:

(8)   *Bibi tells us a story:*

One day, I was in the forest with Vivi. A bear who is friends with Vivi saw us and came to us. Vivi picked a mushroom, a flower. Vivi asked the bear to put them in a basket while she went to the river. Then, Vivi left.

While Vivi was at the river, the bear decided to put only one item in the basket.

Vivi returns, but she doesn't know what happened. Let's help Vivi understand what happened. Vivi asks us:

"What did the bear do? Did he do what I asked him to?"
We answer:
A. *No, he put neither the mushroom nor the flower in the basket.*
B. *No, he didn't put the mushroom or the flower in the basket.*
C. *Both answers*
D. *Another answer: ……………………………………………………….*

For this condition, answer A indicated that the participants preferred the use of the discontinuous conjunction *neither…nor* in scenarios in which one determiner was negated. Of course, this choice was grammatically incorrect, serving as another way to check the participants' attention to the task, alongside their answers to the filler questions. Answer B indicated the preference for the use of disjunction and negation in scenarios in which one determiner was negated (i.e., the disjunctive reading or the "I don't know which" interpretation). Answer C indicated that both choices were used by native speakers, which is again an inaccurate choice, given the ungrammaticality of answer A in this scenario. Choice D indicated that participants preferred another answer, usually a shorter one.

The choice for a forced-elicitation-in-context task was to allow participants to express their own answers, especially for the *1DT* condition, since disjunction in negative sentences is not a commonly used grammatical construction. Instead of

guiding the participants towards using the *neg … or* construction, this task allowed participants to opt for this construction if they found it natural or opt for another construction, in which case, their answers indicated the degree to which native speakers use such constructions.

3.2. Participants and results

For the first experiment conducted on native English speakers, 16 participants were recruited. For the second experiment, 15 participants were recruited. The experiment was designed as a Google Forms quiz, and it took, on average, approximately 10 minutes to complete. The participants were selected on the Prolific platform, and they were all born and living in the United Kingdom to reduce linguistic variation.

Given that the only difference between the two experiments was the alternation between condition and animal, the answers were analysed as coming from one single group. Therefore, in total, all 31 participants were considered statistically relevant (age range 22 – 72, mean age – 37,54). In total, 434 answers were received, out of which 248 were answers to the *NONE* and *1DT* conditions, 124 answers per condition.

The results collected for the two conditions indicated a preference for the interaction between negation and disjunction (see Table 1).

Table 1. Disjunction in negative sentences in English

Condition	Answer	No. of answers	Percentage
NONE	A. *neither…nor*	30	24,2%
	B. *neg…or*	41	33,1%
	C. Both answers	53	42,7%
	D. Other answer	0	0,0%
1DT	A. *neither…nor*	5	4,0%
	B. *neg…or*	13	10,5%
	C. Both answers	2	1,6%
	D. Other answer	104	83,9%

A descriptive analysis of the answers received for the *NONE* condition revealed that English speakers used the combination of negation and disjunction in contexts in which both disjuncts were negated, given the high numbers of B and C answers received (41 and 53 answers, respectively). Similarly, the low number of B answers (n = 13) received for the *1DT* condition further strengthened the preference for the conjunctive reading in English.

The A answers received for the *NONE* condition (n = 30) combined with the B answers received for the *1DT* condition (n = 13) indicated that the disjunctive interpretation is also possible in English, but at a lower rate than the preferred conjunctive interpretation.

The high percentage of D answers received for the *1DT* condition (n = 104) indicated that native English speakers preferred other options than *neg…or* in contexts in which only one disjunct was negated. Instead, they resorted to different means of expressing this concept (see Table 2).

Table 2. Typical D answers for the *1DT* condition in English

Condition	Typical D answers	No. of answers	Percentage
1DT	D. The bear (only) put one item in the basket.	76	61,3%
	D. The bear (only) put one item in the basket, but I don't know which.	20	16,1%
	D. The bear put either one item or the other in the basket.	5	4,0%
	D. We aren't told what was put in the basket. It could have been one of the requested items or maybe something else.	3	2,4%

In general, the D answers analysed for the 1DT condition showed that the native English participants preferred a more direct way of expressing that only one member of the disjunct was negated while the other remained true. This more direct way involved the avoidance of the interaction between two logical operators (i.e., "only one item"). A possible reason why participants chose such answers is that they felt compelled to obey the Cooperation Principle and the Maxim of Relation (Grice 1975) since they felt that the interaction between negation and disjunction gives rise to ambiguities.

In contrast, for the scenario in which both members of the disjunct were negated, there was a preference for the use of two logical operators where negation had wide scope over disjunction.

Nevertheless, because there was a preference for the use of *neg … or* in the scenarios in which both members of the disjunct were negated, and a lack of preference for the use of *neg … or* in the scenarios in which only one member was negated, the conclusion drawn was that English is a language in which the preference is towards the narrow scope of disjunction. This also established the goal L2 learners of English aspire to reach, that of disjunction as a –PPI operator.

4. Disjunction in negative sentences in Romanian

The investigation into how native Romanian speakers interpret disjunction in negative sentences had a dual aim. The first aim was to provide an answer to the following research question:

(ii) What is the preference of adult native speakers of Romanian regarding the interaction between negation and disjunction?

The second aim was to analyse whether English and Romanian exhibit a similar behaviour with respect to disjunction in negative sentences, as shown in Szabolcsi's Lexical Parameter (2002) and the experimental study conducted on children by Bleotu et al. (2024) or whether they exhibit a contrasting behaviour, as shown by the experimental research conducted by Lungu et al. (2021). Moreover, should the present investigation on native speakers of Romanian reveal that there were indeed differences between the preference in Romanian and the preference in English, such findings would provide a basis for understanding how Romanian-speaking learners of English learn the preferred interpretation of disjunction in negative sentences.

4.1. Methodology and procedure

For the native Romanian linguistic group, the same forced-elicitation-in-context task was used, the translation of the task designed for the native English group. The participants received the same scenarios with the animals interacting with two objects. The task was divided into two experiments with the *NONE* condition and the *1DT* condition alternating with the animals present in the stories, so the same participant did not encounter the same animal in a single experiment.

An example of the *NONE* condition is (9), the translation of example (7):

(9)   *Bibi ne spune o poveste:*

Într-o zi eram în pădure cu Vivi. Un ursuleț care e prieten cu Vivi ne-a văzut și a venit la noi. Vivi a cules o ciupercă, o floare. Vivi l-a rugat pe ursuleț să le pună într-un coș cât se duce ea la râu. Apoi, Vivi a plecat.

În timp ce Vivi era la râu, ursulețul a hotărât că nu vrea să pună obiectele în coș.

Vivi se întoarce, dar nu știe ce s-a întâmplat. Hai să o ajutăm pe Vivi să înțeleagă ce s-a întamplat.

       Vivi ne întreabă:
       "Ce a făcut ursulețul? A făcut ce am l-am rugat?"
        Noi zicem:

A. *Nu, nu a pus nici ciuperca, nici floarea în coș.*
B. *Nu, nu a pus ciuperca sau floarea în coș.*
C. *Ambele răspunsuri*
D. *Alt răspuns: …………………………………………………………………...*

For this condition, the A answer indicated a preference for disjunctive reading, while the B and C answers indicated a preference for the conjunctive reading. Answer D indicated that participants preferred another choice, usually a shorter one.

    An example of the *1DT* condition is (10), the translation of example (8):

(10)   *Bibi ne spune o poveste:*

       Într-o zi eram în pădure cu Vivi. Un ursuleț care e prieten cu Vivi ne-a văzut și a venit la noi. Vivi a cules o ciupercă, o floare. Vivi l-a rugat pe ursuleț să le pună într-un coș cât se duce ea la râu. Apoi, Vivi a plecat.

       În timp ce Vivi era la râu, ursulețul a hotărât că vrea să pună doar un obiect în coș.

       Vivi se întoarce, dar nu știe ce s-a întâmplat. Hai să o ajutăm pe Vivi să înțeleagă ce s-a întâmplat.

       Vivi ne întreabă:
       "Ce a făcut ursulețul? A făcut ce l-am rugat?"
       Noi zicem:

A. *Nu, nu a pus nici ciuperca, nici floarea în coș.*
B. *Nu, nu a pus ciuperca sau floarea în coș.*
C. *Ambele răspunsuri*
D *Alt răspuns: …………………………………………………………….*

For this condition, the A and the C answers were grammatically incorrect choices given the fact that the animal interacted with one object, but the statement contained a discontinuous conjunction that negated both objects. Answer B indicated a preference for the disjunctive interpretation of disjunction. Answer D indicated that participants preferred another means of showing that only one member of the disjunction was negated.

4.2. Participants and results

For the first experiment on the Romanian linguistic group, 43 participants were recruited. For the second experiment, 33 participants were recruited. They received a Google Forms quiz, which took, on average, approximately 10 minutes to complete. The participants were all native speakers of Romanian.

Similarly, the answers were analysed as coming from one single group. Therefore, all 76 participants were considered statistically relevant (age range 18–57, mean age – 34,56). In total, 1,064 answers were received, out of which 608 answers were for the *NONE* and *1DT* conditions, 304 answers per condition.

For the *NONE* and *1DT* conditions, the results received indicated a clear preference regarding the interaction between the two logical operators (see Table 3).

Table 3. Disjunction in negative sentences in Romanian

Condition	Answer	No. of answers	Percentage
NONE	A. *neither…nor*	276	90,8%
	B. *neg…or*	4	1,3%
	C. Both answers	23	7,6%
	D. Other answer	1	0,3%
1DT	A. *neither…nor*	2	0,7%
	B. *neg…or*	254	83,6%
	C. Both answers	3	1,0%
	D. Other answer	45	14,8%

The high number of A answers received for the *NONE* condition (n = 273), combined with the high number of B answers received for the *1DT* condition (n = 254), indicated a clear preference for the disjunctive reading, or the interpretation according to which disjunction has the +PPI status, which allows it to escape the scope of negation.

The presence of 4 B answers in the *NONE* condition and the 36 D answers in the *1DT* condition showed that conjunctive reading is possible in Romanian, although the preference is for the disjunctive reading. This further showed that what differentiates between languages is the degree to which they allow the +/- PPI interpretation of disjunction in negative sentences (Lungu et al. 2021).

Although the number of D answers for the 1DT condition was low (n = 36), this indicated the inherent ambiguity of contexts in which only one member was negated and the need to make do with this ambiguity (see Table 4).

Table 4. Typical D answers for the *1DT* condition in Romanian

Condition	Typical D answers	No. of answers	Percentage
1DT	D. Ursulețul a pus doar un obiect în coș. *The bear put only one item in the basket.*	36	11,8%
	D. Ursulețul a pus un (singur) obiect în coș. *The bear put (just) one item in the basket.*	4	1,3%
	D. Ursulețul nu a pus ambele obiecte în dulap. *The bear did not put both items in the basket.*	2	0,7%
	D. Posibil ca ursulețul să fi pus primul obiect, sau posibil să fi pus al doilea obiect în coș. *It's possible that the beat put the first or the second item in the basket.*	2	0,7%
	D. Ursulețul a pus decât un obiect în coș. *The bear put only one item in the basket.*	1	0,3%

The stock of D answers received for the *1DT* condition indicated that some native speakers of Romanian preferred a more concise way of expressing that only one member of the disjunct was negated, namely, the use of other polarity items that would make the message clearer (e.g., "only one item"). Moreover, the number of D answers received for the *1DT* condition from the Romanian group (14,8%) was much lower than for the English group (83,9%), indicating that this is not the preference in Romanian, but a personal tendency of some participants.

In conclusion, these results confirmed that Romanian is a language in which the preference is towards the wide scope of disjunction in its interaction with negation. This also established the starting point for L2 learners of English, that of disjunction as a +PPI operator.

5. Disjunction in negative sentences in L2 English

The findings of the previous two experiments revealed cross-linguistic differences in the interpretation of negated disjunction in English and Romanian. In English, the results aligned with the predictions of the Lexical Parameter: a preference for the conjunctive interpretation, according to which disjunction has the –PPI parametric value.

In contrast, Romanian diverged from the predictions of the Lexical Parameter, displaying a preference for the disjunctive interpretation, according to which disjunction has the +PPI parametric value. These results confirmed the status of

Romanian proposed by Lungu et al. (2021), namely that Romanian shows a higher degree of acceptability for the +PPI reading.

Taking into account these findings, a third experimental study was conducted to answer the following research question:

(iii) Can Romanian-speaking learners of L2 English learn the appropriate parametric value in English, and do they have difficulties in resetting their native parametric value?

5.1. Predictions

The present study adopts the Full Transfer Full Access Hypothesis (Schwartz and Sprouse 1994; Schwartz and Sprouse 1996) as the theoretical framework for predicting the behaviour of L2 learners of English. According to this framework, L2 learning happens in stages. At the initial stage of learning, learners transfer the grammar and parameter settings from their mother tongue. In this interlanguage stage, there is variation between the two settings of the same parameter. In the later stage of learning, learners can restructure their interlanguage grammar beyond the constraints of their L1 since they have full access to Universal Grammar, which makes the opposite parameter setting available.

In light of this framework, the predictions are that in the early stages of English learning, there is variation between the parameter setting of negated disjunction and that learners transfer their preferred parametric value from Romanian, i.e., the +PPI value of negated disjunction.

Grüter et al. (2010) conducted a similar study investigating the L2 learning of the interpretation of negated disjunction in English and Japanese. The experiments were designed as a truth-value judgement task with test questions such as (12):

(12)   *The dog ate the cake, but he didn't eat the carrot or the pepper*.

(Grüter et al. 2010, 151)

The English control group consistently preferred the –PPI interpretation, while the Japanese control group consistently preferred the +PPI interpretation.

The results from the L2 English group were similar to the results of the L1 Japanese group, thus proving that there is transfer of the +PPI interpretation from Japanese. The results from the L2 Japanese group were generally similar to the results of the L1 Japanese group, showing that learning a different parametric value is possible. However, some L2 Japanese respondents concisely preferred their native +PPI interpretation and showed transfer patterns.

Drawing on the Full Transfer Full Access Hypothesis (Schwartz and Sprouse 1994; Schwartz and Sprouse 1996) and the study by Grüter et al. (2010), the prediction for the present study is that the preferred parametric value of negated disjunction will be transferred from Romanian to English.

5.2. Methodology and procedure

The Romanian-speaking L2 learners of English group received the same forced-elicitation-in-context task as the native English group. The only difference was in the administration of the task: the L2 English group received the task printed on paper during classes at school. It took participants approximately 20 minutes to complete the task.

The task was divided into two experiments with the *NONE* condition and the *1DT* condition alternating with the animals present in the stories, but eventually, the responses were analysed as a unified group.

5.3. Participants and results

The L2 English group consisted of 7th and 8th-grade students from a public school in Bucharest who were asked to evaluate their own proficiency in English.

In the first experiment, 21 7th-grade students were included. Due to the predominance of wrong answers given for the filler questions and of answers containing *neither …non* given for the *1DT* condition, 5 participants were excluded; due to the answer containing *neg…or* being consistently chosen for both the *NONE* and *1DT* condition, 1 participant was excluded. Therefore, 15 participants were considered statistically relevant (age range 13 − 14, mean age − 13,60). Their proficiency levels varied from A2 to B1.

For the second experiment, 18 8th-grade students were included. Based on the wrong answers received for the filler questions and the high number of answers containing *neither …non* received for the *1DT* condition, 3 participants were excluded; based on the high number of answers containing *neg…or* for both the *NONE* and *1DT* condition, 1 participant was excluded. Therefore, 14 participants were considered statistically relevant (age range 14 − 16, mean age − 14,42). Their proficiency levels varied from B1 to B2.

As before, the answers were analysed as coming from a single group. In total, 29 participants were considered statistically relevant (age range 13 − 16, mean age

– 14,01). In total, 406 answers were received, out of which 232 answers were for the *NONE* and *1DT* conditions, 116 per condition.

Initially, the answers received for the *NONE* and *1DT* conditions were analysed in order to establish a response pattern (see Table 5).

Table 5. Disjunction in negative sentences in L2 English

Condition	Answer	No. of answers	Percentage
NONE	A. *neither…nor*	81	69,8%
	B. *neg…or*	19	16,4%
	C. Both answers	10	8,6%
	D. Other answer	6	5,2%
1DT	A. *neither…nor*	3	2,6%
	B. *neg…or*	31	26,7%
	C. Both answers	0	0,0%
	D. Other answer	82	70,7%

The native English response pattern (i.e., the conjunctive interpretation) consisted of a predominance of B and C answers in the *NONE* condition, combined with a low frequency of B answers and a high frequency of D answers in the *1DT* condition. In contrast, the native Romanian response pattern (i.e., the disjunctive interpretation) was characterised by a high incidence of A and a low incidence of B answers in the *NONE* condition, alongside a predominance of B answers in the *1DT* condition.

However, the descriptive analysis of the L2-English responses revealed that there was no clear preference towards one of those patterns (see Table 6).

Table 6. Comparison of answers per language

Condition		Answer	English	Romanian	L2 English
NONE	A.	*neither…nor*	24,2%	90,8%	69,8%
	B.	*neg…or*	33,1%	1,3%	16,4%
	C.	Both answers	42,7%	7,6%	8,6%
	D.	Other answer	0,0%	0,3%	5,2%
1DT	A.	*neither…nor*	4,0%	0,7%	2,6%
	B.	*neg…or*	10,5%	83,6%	26,7%
	C.	Both answers	1,6%	1,0%	0,0%
	D.	Other answer	83,9%	14,8%	70,7%

Nevertheless, the descriptive analysis of the answers received from the L2 group revealed some tentative findings. For the *NONE* condition, the L2-English responses

were closer to native Romanian in preferring the A answer, but the sizable proportion of B answers shows a slight increase for English-like preference. In addition, for the *1DT* condition, the L2-English responses showed a majority of D answers, similar to the English-like interpretation, but the substantial proportion of B answers indicates a Romanian-like tendency.

Moreover, the typical D answers for the *1DT* condition were similar to those received from the native English group, although in a smaller percentage   (see Table 7).

Table 7. Typical D answers for the *1DT* condition in L2 English

Condition	Typical D answers	No. of answers	Percentage
1DT	D. The bear (only) put one item in the basket.	74	63,8%
	D. The bear didn't put both items in the basket.	6	5,2%
	D. The bear put just one item in the basket.	1	0,9%
	D. wrong answer	1	0,9%

Given that the responses from the L2 English group did not align exclusively with either response pattern, an individual-level analysis was conducted to identify potential transfer patterns and the proficiency level at which such transfer begins to diminish. Therefore, three response types were identified:

i) the conjunctive/ English-like type – 2 or more B or C answers in the *NONE* condition and 3 or more D answers in the *1DT* condition;
ii) the disjunctive/ Romanian-like type – 2 or more A answers in the *NONE* condition and 3 or more B answers in the *1DT* condition;
iii) the mixed type – 2 or more A answers in the *NONE* condition and 3 or more D answers in the *1DT* condition.

The conjunctive response type consisted of 7 participants who predominantly displayed an English-like behaviour, while the disjunctive response type consisted of 7 participants whose answers consistently aligned with the Romanian preference pattern (see Table 8).

Table 8. The conjunctive and disjunctive response types

Conjunctive response type

No.	Condition							
	NONE				*1DT*			
	A	B	C	D	A	B	C	D
1	1	3	0	0	1	0	0	3
2	1	0	2	1	0	0	0	4
3	2	0	2	0	0	0	0	4
4	2	2	0	0	0	0	0	4
5	2	2	0	0	0	0	0	4
6	2	0	2	0	0	0	0	4
7	2	2	0	0	0	0	0	4

Disjunctive response type

No.	Condition							
	NONE				*1DT*			
	A	B	C	D	A	B	C	D
1	4	0	0	0	0	4	0	0
2	4	0	0	0	0	4	0	0
3	4	0	0	0	0	4	0	0
4	4	0	0	0	0	4	0	0
5	4	0	0	0	0	3	0	1
6	3	0	0	1	0	4	0	0
7	2	0	0	2	0	4	0	0

These results revealed that approximately a quarter of the L2 English learners had attained the interpretation of negated disjunction preferred in English, i.e., the −PPI interpretation, whereas another quarter of the participants still fully retained the interpretation preferred in Romanian, i.e., the +PPI interpretation.

The majority of participants (n = 15) were categorised as mixed respondents, showing no clear pattern in their interpretation of negated disjunction in English (see Table 9).

Table 9. The mixed response type

Mixed response type

No.	Condition							
	NONE				*1DT*			
	A	B	C	D	A	B	C	D
1	3	0	1	0	0	0	0	4
2	3	0	1	0	0	0	0	4
3	3	1	0	0	0	0	0	4
4	4	0	0	0	0	0	0	4
5	4	0	0	0	0	0	0	4
6	3	1	0	0	0	0	0	4
7	3	1	0	0	0	0	0	4
8	3	1	0	0	1	0	0	3
9	1	1	0	2	0	2	0	2
10	3	0	1	0	0	0	0	4
11	3	1	0	0	0	0	0	4
12	3	1	0	0	0	0	0	4
13	3	1	0	0	0	0	0	4
14	1	2	1	0	1	1	0	2
15	4	0	0	0	0	1	0	3

In general, these participants avoided the use of *neg…or*, irrespective of the context, yet they preferred the use of *neither…nor* when both disjuncts were negated and the use of a simpler answer when only one disjunct was negated. This indicated that they displayed a Romanian-like preference in the *NONE* condition and an English-like preference in the *1DT* condition.

In addition, irrespective of the respondent type, the self-assessed proficiency levels ranged from A2 to B2. Thus, no conclusion could be drawn regarding the proficiency level at which L1 transfer begins to diminish.

6. Conclusions

The experimental study on learners of English aimed to investigate whether Romanian speakers were able to learn the parametric value of negated disjunction characteristic of English, namely the –PPI value, and whether their interpretation was influenced by the parametric value characteristic of Romanian, namely the +PPI value.

The results analysed for the conjunctive group provided clear evidence that the learning of the –PPI parametric value is possible, while the results analysed for the disjunctive group showed evidence of transfer from the native language. The results analysed for the mixed respondent group placed these participants in an interlanguage phase, during which there is uncertainty regarding the use of the two logical operators. Nonetheless, because these participants preferred, almost exclusively, to avoid *neg…or* in contexts in which only one disjunct was negated, it could be concluded that they had moved beyond the initial stage of transfer from Romanian and were heading towards the English-like interpretation.

A further objective of this experimental study was to investigate at what proficiency level transfer from the mother tongue begins to diminish. However, since for all three respondent types identified, the proficiency level ranged from A2 to B2, no definitive conclusion could be reached.

7. Final Remarks

The current study was based on the Lexical Parameter (Szabolcsi 2002) and the way in which languages are divided according to the interpretation of disjunction in negative sentences. Originally, English and Romanian were considered part of the same linguistic group: languages in which disjunction is interpreted as –PPI. The status of English was confirmed by numerous experimental studies (Gualmini and Crain 2005, Grüter et al. 2010, Lungu et al. 2021, Jasbi et al. 2023), while the status of Romanian remained uncertain between children preferring the –PPI interpretation (Bleotu et al 2024) and adults preferring the +PPI interpretation (Lungu et al. 2021).

The main concern of the present study was to investigate how Romanian-speaking learners of L2 English interpret disjunction in negative sentences, but, given the disputed status of Romanian regarding the preferred interpretation, the first step in doing so was to investigate, in a unified manner, how native speakers of English and of Romanian interpret negated disjunction. Using a forced-elicitation-in-context task, it was revealed that English speakers preferred the –PPI, or conjunctive reading, while Romanian speakers preferred the +PPI, or disjunctive reading.

The same task was used on an L2 English group, and the results indicated that learning the parameter setting in English was possible (the conjunctive respondent group), that transfer from Romanian was present (the disjunctive group) and that the majority of participants were at an interlanguage phase of oscillation between the Romanian and English interpretation.

References

Bleotu, Adina Camelia, Lyn Tieu, Mara Panaitescu, Gabriela Bîlbîie, Anton Benz, and Andreea Nicolae. 2024. "Negative Disjunctive Sentences in Child and Adult Romanian: A Preference for Strong Interpretations." Poster presented at the *37th Annual Conference on Human Sentence Processing*. University of Michigan, 16-18 May 2024.

Grice, Paul H. 1975. "Logic and Conversation." *Syntax and Semantics 3: Speech Acts*: 41–58.

Grüter, Theres, Moti Lieberman, and Andrea Gualmini. 2010. "Acquiring the Scope of Disjunction and Negation in L2: A Bidirectional Study of Learners of Japanese and English." *Language Acquisition* 17(3): 127–154.

Gualmini, Andrea and Stephen Crain. 2005. "The Structure of Children's Linguistic Knowledge." *Linguistic Inquiry* 36(3): 463–474.

Jasbi, Masoud, Natalia Bermudez, and Kathryn Davidson. 2003. "Default Biases in the Interpretation of English Negation, Conjunction, and Disjunction." *Experiments in Linguistic Meaning* 2: 129–144.

Lungu, Oana, Anamaria Fălăuș, and Francesca Panzeri. 2021. "Disjunction in Negative Contexts: a Cross-linguistic Experimental Study." *Journal of Semantics* 37(2): 221–247.

Schwartz, Bonnie D. and Rex A. Sprouse. 1994. "Word Order and Nominative Case in Non-Native Language Acquisition: A Longitudinal Study of (L1 Turkish) German Interlanguage." In *Language Acquisition Studies in Generative Grammar: Papers in honor of Keneth Wexler from the 1991 GLOW Workshops*, ed. by Tun Hoekstra and Bonnie D. Schwarts, 317–368. Philadelphia, PA: John Benjamins.

Schwartz, Bonnie D. and Rex A. Sprouse. 1996. "L2 Cognitive States and the Full Transfer/Full Access Model." *Second Language Research* 12(1): 40–72.

Szabolcsi, Anna. 2002. "Hungarian Disjunctions and Positive Polarity." *Approaches to Hungarian* 8: 217–241.

Szabolcsi, Anna. 2012. "Scope and Binding". In *Semantics: An International Handbook of Natural Language Meaning,* ed. by Klaus von Heusinger, Claudia Maienborn and Paul Portner, 1605–1640. Boston: De Gruyter Mouton.

Szabolcsi, Anna, and Bill Haddican. 2004. "Conjunction Meets Negation: A Study in Cross-Linguistic Variation." *Journal of Semantics* 21(3): 219–249.