

# Interpretation of Croatian Null and Overt Subject Pronouns in Inter-Sentential Contexts Disambiguated by Pragmatics

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UNIVERSITY OF RIJEKA  
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**INTERPRETATION OF CROATIAN NULL AND OVERT SUBJECT  
PRONOUNS IN INTER-SENTENTIAL CONTEXTS DISAMBIGUATED  
BY PRAGMATICS**

Submitted in partial fulfillment of the requirements for the M.A. in English Language and  
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**Dr Tihana Kraš**

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## **Abstract**

This thesis examines the monolingual Croatian speaker strategies concerning null and overt subject pronoun interpretation in inter-sentential contexts disambiguated by pragmatics. It reports the findings of an experimental study, which involved child and adult participants, and which investigated whether the PAS, the pronoun interpretation strategy proposed by Maria Carminati for the Italian language, holds in inter-sentential contexts in Croatian language. The participants were presented with a set of experimental items, each of which comprised two sentences. The first sentence contained two noun phrases in the role of the subject and the object. The second sentence contained a null or an overt pronoun, and was biased towards either the subject or the object of the previous sentence as the antecedent of the pronoun. The participants were asked to determine how much sense the second sentence makes in relation to the first one on a seven-point grading scale.

The results show that Croatian adult speakers tend to associate the null pronoun with the subject antecedent and the overt pronoun with the object antecedent in inter-sentential contexts disambiguated by pragmatics. Croatian children aged 13-15 have shown the same tendencies concerning the null pronoun interpretation, but associated the overt pronoun equally with the subject and the object i.e. have not shown adult-like behavior in terms of overt pronoun interpretation in inter-sentential contexts disambiguated by pragmatics.

## Table of contents

Introduction .....	1
2 Anaphora resolution .....	3
2.1 Developmental perspective .....	4
2.2 Position of Antecedent Strategy .....	5
2.3 Crosslinguistic considerations .....	7
3 Previous research and underlying methodological issues .....	9
3.1 Methodological issues .....	9
3.2 Previous research involving pragmatic disambiguation.....	11
4 The study .....	13
4.1 Aims and predictions.....	13
4.2 Participants .....	14
4.3 Materials and procedure .....	14
4.4 Results .....	17
5 Discussion .....	20
6 Conclusion.....	22
References .....	24
Appendix .....	27
1. Questionnaires .....	27
1.1. Questionnaire (Adults) .....	27
1.1. Questionnaire (Children).....	30
2. Grading scale task items.....	32
2.2. Experimental items.....	32
2.2. Fillers.....	35
2.3. Instructions .....	36

## Introduction

The interconnection between syntactic and pragmatic aspects of language has generated a lot of interest in the field of psycholinguistics. Anaphoric relations<sup>1</sup> involving pronouns have been one of the most prominent topics in these studies; they provide a valuable insight into the functioning of the syntax-pragmatics interface since a lot of different factors play a role in interpreting what the most plausible antecedent of a pronominal form is. However, because intricacies of these relations are only observable within *pro*-drop languages (the languages that allow the omission of subject pronouns), and English as the most thoroughly studied language is not one of such languages, the research has not been conclusive thus far.

The most frequent approach used to inspect what strategies we employ while choosing an antecedent of a pronoun is the introduction of multiple, usually two, possible referents and then observing which of the referents has been retrieved (Carminati, 2002; Sorace & Filliaci 2006; Kraš 2008). As previously stated, a lot of variables play a role here, either of syntactic (e.g. gender cueing, variation of referent position) or pragmatic (e.g. contextual information) nature. The application of these variables results in disambiguation and a bias towards one of the referents, which enables examination of the exact role that the syntactic-pragmatics interface plays in anaphora resolution. Several strategies, mentioned by Carminati (2002) gained recognition through such research, such as:

- the parallel strategy, which proposes that the pronoun with two or more plausible antecedents will be interpreted as coreferential with the antecedent that assumes the same grammatical role,

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<sup>1</sup> The of a linguistic unit the interpretation of which depends on another unit within the context

- the first mention bias, which predicts that expressions appearing early in the context are more likely to be chosen as the antecedent of a pronoun,
- the topic bias, which assumes that antecedents with higher prominence will be accessible more easily thus becoming the most plausible antecedent,
- the subject bias, assumption of which is that the expression that takes up the syntactic role of the subject becomes the most plausible antecedent for interpretation of the pronominal form.

The fact that *pro*-drop languages allow the omission of a subject pronoun in preverbal position of finite clauses means that the subject pronoun may be overtly expressed (overt) or dropped (null), which may lead to certain doubts as to how either of them are interpreted. The prevalent view currently holds that the processor that is in charge of null and overt pronoun co-referencing is predominantly governed by the structural and configurational attributes of the antecedents, while the semantic features of the possible referents have less impact on their interpretation in terms of anaphora resolution. This view assumes that null and overt pronouns have their distinct functions and, therefore, distinct innate biases when it comes to their interpretation.. The proposition is that null pronouns favor the antecedents in the Spec IP position, or the position that carries the highest degree of prominence which is in the majority of cases the subject, while the overt pronoun favors referents of lower prominence, usually the object (Carminati, 2002). The notion that the prominence of the arguments is intertwined with their structural position has been mentioned in several studies; it was claimed that it depends on first mentioned participants (Gernsbacher, 1989), syntactic subjects (Arnold, 1998; Grosz et al., 1995), focus (left dislocation in a cleft construction; Arnold 1998) and topichood (Gundel, Hedberg, & Zacharski, 1993) and it became the main postulate of the Position of Antecedent Strategy (Carminati, 2002) theory described above, proposed for the Italian language, which will be explored in detail in chapter 2. The theory

gained further support across other *pro*-drop languages, most prominently Spanish (Alonso-Ovalle, Clifton, Frazier & Fernandez Solera, 2002) and Croatian (Kraš, 2008; Stipeć, 2012), the language relevant to this study.

However, most of the research on the topic revolved around anaphora resolution in ambiguous contexts, so some researchers set forth to test the proposal. Their hypothesis was that in informationally richer anaphors that introduce disambiguation in terms of morphology or contextual information, the processor responsible for determining antecedents of pronominal forms may not behave in line with PAS. The idea is that the strategy dealing with pronominal reference is not set in stone, but rather operates on a continuum between syntax and pragmatics and allows certain variations, with the question of whether it may completely defy the logic presented in Carminati's proposal. The research carried out in that regard will be closely assessed in Chapter 3 since the goal of this study will be to determine how Croatian monolingual native speakers, both adults and children, approach anaphora resolution in contexts disambiguated by pragmatics.

## **2 Anaphora resolution**

Before the presentation of the most important previous research dealing with this topic as well as of the study itself, it is of vital importance to understand the theory that underlies the phenomena of anaphora resolution both in terms of language acquisition and its differentiation across languages. These cross-linguistic and language acquisition considerations, alongside the already mentioned Position of Antecedent Strategy as the currently predominant theory, will be briefly discussed in the following text.



## 2.1 Developmental perspective

In order to come to a better understanding of the mechanism that underlies the resolution of anaphoric relations in *pro*-drop languages, it is important to observe how those mechanisms are developed and acquired in the first place. Most of the psycholinguistic research that dealt with that domain of language acquisition came to a conclusion that the processor responsible for the behavior of pronouns becomes active at very early stages of child development (Guasti & Chierchia, 1999), although certain difficulties regarding backward anaphora management have been reported (Tavakolian, 1978).

Concerning the differences between null and overt pronoun antecedent preferences, it has been concluded that these preferences develop earlier with null pronouns than with overt pronouns (Serratrice, 2007; Kraš, Stipeć & Rubčić, in press). Adult-like behavior concerning null pronoun interpretation has been observed in children aged 6-7, while there is still no evidence that children as old as 12 interpret overt pronouns in an adult-like fashion i.e. they are still more prone to establishing coreference between the overt pronoun and the subject instead of the object antecedent. These findings have been consistent across multiple *pro*-drop languages, most prominently Italian (Serratrice 2007) and Croatian (Kraš, Stipeć & Rubčić, in press), and have provided the basis for choosing participants for this study.

Although the main focus of this study are monolingual speakers of Croatian, it is worth mentioning that this developmental delay had been observed in bilingual language acquisition as well. The integration of various sources of information at the syntactic-pragmatics interface responsible for pronominal form interpretation has proven to be quite a demanding task both for simultaneous and consecutive bilingual speakers (Hulk & Muller, 2000; Sorace & Filiaci, 2006; Sorace, Serratrice, Filiaci, & Baldo, 2009; Tsimpli, Sorace, Heycock, & Filiaci, 2004).

Bilingual children, as opposed to monolingual children of the same age, occasionally allow the object as the preferred antecedent of null pronouns and are more prone to associating the overt pronoun with the subject, which is not in line with the behavior of typically developing monolingual children and adults (Serratrice, 2007; Kraš, Rubčić & Stipeć, in press).

## **2.2 Position of Antecedent Strategy**

We have witnessed a gradual evolution with regards to psycholinguistic understanding of the processor that guides null and overt pronoun interpretations in anaphoric relations. The strategies that were initially proposed, such as strategies of parallel function or first mention, were seen as unsatisfactory and inadequate once the research base related to this topic began to grow. The current most widely accepted view, the PAS established by Maria Carminati, may be considered as an amalgamation of certain sections of preceding theories, but specific in its own right. Obviously, the theory is observable exclusively in languages that allow the omission of pronominal forms in the preverbal subject position of final clauses, or, in other words, languages that allow two distinct options at that position – null and overt pronouns.

The main idea of this theory, which had been briefly touched upon in the introduction, is that in situations which call for selecting the most plausible antecedent for a pronoun, the most common *modus operandi* is associating null pronouns with referents in the subject position (which coincides with the discourse topic in most cases) and associating overt pronouns with non-topical, object antecedents. This leads to a conclusion that the use of null pronouns suggests topic continuation and of overt pronouns indicates topic shift (Sorace, 2000).

Although there had been some criticism of her theory, particularly of the fact that it does not adequately address the role of context in anaphora resolution, Carminati has shown, through a series of experiments, that the PAS is much more effective in terms of pronoun interpretation than the strategies based on ambiguity avoidance<sup>2</sup> and economy of language<sup>3</sup> since it covers a wider array of cases. She further claims that the PAS is not governed by processes relying solely on grammatical rules but is rather motivated by our cognition in general. The plausibility of an antecedent is therefore determined under the influence of prominence relations which are programmed into the discourse through syntax (Filliaci, Sorace & Carreiras, 2013). Her claims were supported by several studies which concluded that the processor responsible for pronoun interpretation does not suffer a delay when initially assigning a referent to a pronoun but rather operates on a more shallow level similar to early grammatical processing, and is relatively automatized (Frazier, 1990). In a nutshell, the conclusion is that prominence of the possible referents, as a key factor in anaphora resolution, is predominantly regulated by their configurational and syntactical attributes.

However, because the PAS puts such a high emphasis on the role of syntax with regard to antecedent accessibility, while various research has proven that antecedent salience is also influenced by discourse cohesion, recency of mention, number of competitors (Ariel 1990, 1991), topicality (Almor, 1999) and lexical frequency of the antecedent (van Gompel & Majid, 2004), which are nominally not syntactic features, the PAS may not be considered the ultimate solution to the analysis of processes that underlie pronoun interpretation in *pro*-drop languages. It should rather be considered as a framework within which adjustment of the variables across the syntactic-pragmatic interface may yield unpredictable behaviour and challenge the theory itself, which is one of the key motivational points of this study.

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<sup>2</sup> The theory that the overt pronoun is favored in cases in which it aids in disambiguation (Carminati, 2002, p. 79-80)

<sup>3</sup> The theory that the null pronoun is favored in general (p. 80)

## 2.3 Crosslinguistic considerations

Before delving deeper into the problematic of anaphora resolution strategies, it is essential to look into how well do the established theories hold across different *pro*-drop languages, since the study at hand is focused exclusively on monolingual Croatian native speakers.

Gathering and integrating data with the goal of recognizing what exact properties are shared among *pro*-drop languages has proven to be quite a demanding task. Since most of these languages are typologically different, the linguistic phenomena such as pronoun interpretation may not be considered uniform across all of the languages (Filliaci, 2010).

As stated in section 2.1, the principle of associating the null pronoun with the antecedent with the highest prominence is acquired at the earliest stages of language development, so we may expect that this preference will be observable in all of the *pro*-drop languages. However, Serratrice (2007) reports that both typically developing children and adults have chosen the subject as the most plausible antecedent of a null pronoun in forward anaphora only approximately half of the time, which was also found in several other studies (Belletti, Bennati, & Sorace 2007, Sorace & Filiaci, 2006, Tsimpli et al., 2004), which used the same picture selection task. On the other hand, using an adapted version of the task, Kraš (2008) found that there is a clear preference for the subject in the case of null pronouns in Italian speaking adults. Such contradictory evidence seems to suggest that differences may not be detected only across different languages, but within one language as well, which considerably challenges the overall legitimacy of the PAS.

Concerning the overt pronoun, it is seen as the more flexible pronominal form in terms of anaphoric reference, which is partially evident from the fact that adult-like overt pronoun

interpretation is acquired in late childhood. The division of labor between the null and the overt pronoun along the lines of the PAS has been challenged in terms of overt pronoun interpretation as well. A study carried out with Spanish monolingual speakers has shown that they associated the overt pronoun with the object antecedent less than half of the time (Keating, VanPatten & Jagerski, 2011), while their Italian counterparts made the expected co-reference in over 80% of the time (Carminati, 2002, Experiment 2). In other studies with Spanish speakers that dealt with inter-sentential anaphora, which is of high relevance to this study, Alonso-Ovalle et al.'s (2002) findings were consistent with the aforementioned one – the participants behavior was not in line with the PAS as they chose the object as the antecedent of the overt pronoun approximately half of the time.

Despite the fact that there is a certain amount of evidence that may be considered as contradictory to the PAS, empirical evidence suggests that Croatian, which is the language at the focus of this study, is fairly consistent with antecedent biases of null and overt pronouns in Italian, which is in turn largely consistent with the PAS (Kraš, 2008; Kraš & Stipeć, 2013). However, relatively few studies have been conducted in this regard, so further research is required to draw conclusions on whether Croatian speakers act in line with the PAS.

## 3 Previous research and underlying methodological issues

### 3.1 Methodological issues

While testing the PAS, Carminati strongly relied on the assumption that in sentences where the subordinate clause precedes the main clause, the information from the subordinate clause is retained and carried over until the main clause is processed. Therefore, her research almost exclusively tested the behavior of the processor responsible for anaphora resolution in contexts with subordinate-main clause order. She argues that we are more likely to retain information from the subordinate clause if it is followed by the main clause, while details on the main clause may be lost if the subordinate clause is to be processed subsequently. However, she admits that the testing ground for the PAS theory is consequently narrowed and that an expansion of research in order to include a wider array of possible contexts is needed (Carminati, 2002).

The issue that stems from this is that antecedent preference has mostly been studied in intra-sentential<sup>4</sup> contexts while inter-sentential<sup>5</sup> contexts have not been taken into account. Carminati argues that the difference between these two types of contexts is important and that they should be viewed separately. More precisely:

“It has demonstrated that the assumption that intra- and extra-sentential anaphoras are governed by exactly the same principles is incorrect, and has indicated the need to carefully distinguish between the two domains. I have suggested that the criteria that determine the salience of a referent across sentences may differ, in part, from the criteria that determine it within sentences; in the latter case, prominence in terms of syntactic status is the primary factor; in the former, considerations of a more conceptual nature come into play. This difference is expected when one considers experimental evidence showing that sentence boundaries mark a decay in the recall of surface

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<sup>4</sup> Within a single sentence.

<sup>5</sup> Across two or more sentences.

information in the sentence that has just been processed, suggesting that when semantic interpretation is completed at the end of the sentence, details regarding the syntactic position of referents may be partially lost.” (Carminati, 2002, p. 150)

This leads us to believe that, when dealing with anaphoric relations across sentences, pragmatics and semantics play a more important role in their resolution. However, this still does not guarantee that the processor responsible for resolution of anaphora involving null and overt pronouns will behave unpredictably, even though the context within which the anaphora is realized is both inter-sentential and pragmatically disambiguated. This will additionally be clarified in the Section 4.1.

The final issue that needs to be addressed here is the effect that the use of a connective may have on the analysis of anaphoric relations. Since, as previously mentioned, PAS is mostly founded on observations made in intra-sentential contexts including subordinate-main clause orders which predominantly warrant use of a connective, it is important to see whether it is reasonable to inspect anaphoric relations in cases where there is no connective present, which is the case in inter-sentential contexts. Previous research suggest that the choice of connectives may indeed influence antecedent preference, however the research was more focused on which connective is used between clauses rather than on whether it is used or not (Stevenson et al. 1994). That is the exact reason why connectives will not be used in this study as the variety of possible choices of connectives introduce a new variable to the experiment. However, it is important to note here that all of the previous research performed on monolingual and bilingual Croatian speakers, which was carried out by Kraš, Stipeć and Rubčić (2012), used connectives in the experimental items since their studies involved intra-sentential contexts.

### 3.2 Previous research involving pragmatic disambiguation

Despite the fact that the bulk of evidence which supports the PAS stems was collected in experiments which included ambiguous experimental items with ambiguous contexts, some researchers wanted to further test the theory and see if it applies to contexts which are disambiguated by certain devices. Since the main focus of this study are contexts in which disambiguation is carried out by means of adjustments in the domain of pragmatics, I will take a brief look at some of the related research. Note that this is the first research which includes Croatian monolingual speakers of this type, but some implications may be drawn from research carried out in other languages.

The experiments carried out by Hudson-D’Zmura and Tanenhaus (1998) in which they measured reading times for sentences which were pragmatically disambiguated towards one of the two, otherwise plausible, antecedents, have shown that penalties were lower in cases where disambiguation pointed towards the subject, which is indeed in line with the PAS theory. This experiment was quite similar to the one performed as a part of this study, since it encompassed inter-sentential contexts, forward anaphora and pragmatic disambiguation which all lie at the essence of this study. The only difference was that instead of a null pronoun a repeated name was used since the research was done in English which does not allow the omission of a pronoun as it is not a *pro*-drop language. Sets of experimental items used in that study are similar to the experimental items that were used in this study, which will be presented in Section 4.3. Here is a sample of experimental items used by Hudson-D’Zmura and Tanenhaus:

- (1) a. Jack apologized profusely to Josh. He had been rude to Jack yesterday.
- b. Jack apologized profusely to Josh. He had been offended by Jack’s comment.



Another relevant study has shown that if sentences are intentionally formed to oppose PAS, a reanalysis is required, which in turn results in longer times that the processor takes to resolve the anaphora (Sorace & Filliaci, 2006). Here is an example of an experimental item that appeared in their study:

(2) ‘Since Mario doesn’t like Gianni he tries to avoid him’.

Finally, to further prove the point that there are no truly substantial differences between anaphora resolution processes in intra-sentential and inter-sentential contexts, we will take a look at the findings which stem from Miltsakaki’s anaphora resolution architecture models: “Whenever a pronoun occurs inside a subordinate clause and there is no compatible potential antecedent inside that clause (for example because the pronoun is a subject), the pronoun is resolved to the most highly ranked available candidate, if any, inside the main clause as defined by semantic focusing preferences. In a second step, pronouns that could not be resolved so far are matched against candidates from the previous discourse unit, this time ranked according to grammatical function” (Champollion, 2006, p. 15). Further findings prove that subject pronouns will be referenced to the subject of the nearest clause in ambiguous contexts. The frequency of associating subject pronoun to the most plausible antecedent, which is the subject in ambiguous contexts, was virtually identical both in intra-sentential and inter-sentential contexts (Champollion, 2006).

## **4 The study**

### **4.1 Aims and predictions**

Bearing all of the mentioned issues in mind, alongside the previous research relevant to this study, one of the goals of this study is to determine how adult Croatian monolingual native speakers approach the resolution of forward anaphora relations in pragmatically disambiguated inter-sentential contexts both for null and overt pronouns.

The results will be assessed with regard to the PAS theory which, on the basis of empirical evidence, assumes that the universal strategy of interpreting null and overt pronouns in pro-drop languages is associating the null pronoun with the subject and associating the overt pronoun with the object. Therefore, it is expected that Croatian native speakers will behave accordingly even in pragmatically disambiguated contexts. However, there is a certain probability that we may witness differences in antecedent preference levels which may not be as emphasized as they are in fully ambiguous contexts i.e. there is a slight expectation that the processor in this specific context may behave unpredictably and not completely in line with PAS.

Another goal of the experiment is to test whether child speakers of Croatian interpret the overt pronoun in an adult-like manner in inter-sentential contexts. Previous research by Kraš, Stipeć & Rubčić (2014) has shown that Croatian children as old as 12 do not interpret overt pronouns in intra-sentential contexts in the same way the adults do, but rather associate them equally with both the subject and the object antecedents. The mean age of participants in this study is 13.8, so the prediction is that their interpretations of the overt pronoun will resemble the behavior displayed by adults at a higher extent i.e. that they will be more likely to associate the overt pronoun with the object antecedent than their younger counterparts.

However, it is not expected that they will show full acquisition of adult-like behavior in terms of overt pronoun interpretation.

## **4.2 Participants**

The study included a group of 28 typically developing children, all monolingual native Croatian speakers aged 13-15 (mean age 13.8) and a group of 28 monolingual adult native Croatian speakers aged 21-25 (mean age 23.1) who served as a control group. All of the participants, both children and adults, were raised in the Međimurje County in Croatia, so no notable differences concerning linguistic upbringing have been recorded. They all speak the same dialect of Croatian.

All of the monolingual, typically developing children were recruited from the same primary school. All of the adult participants were students currently enrolled in Croatian universities, and neither was a student of Croatian or of any foreign language, or a student of linguistics.

## **4.3 Materials and procedure**

The task that was selected to inspect the strategies of anaphora resolution in both children and adult monolingual Croatian speakers was a grading scale task. The materials presented to the participants were divided into two parts. The first part was a questionnaire which was further divided into two subsections; first subsection dealt with general information on the participants while the second section had to do with their linguistic upbringing and language use.

After the questionnaire had been filled out, each of the participants was assigned one of the four presentation lists (A, B, C, D), so each presentation list was completed by seven adults and seven children. The presentation lists comprised a set of 84 sentence pairs. 28 of those were experimental items in which the first sentence was fixed while the second sentence differed across the presentation lists in accordance with the condition that was being tested (Null Pronoun Subject Bias, Null Pronoun Object Bias, Overt Pronoun Subject Bias, Overt Pronoun Object Bias). The remaining 56 sentence pairs served as fillers. Here is an example of how experimental items differed across presentation lists:

- (3) a. Policajac je ganjao lopova. Upalio je sirenu.  
 Policeman.NOM is chasing thief.ACC. *pro* turned is siren.  
 ‘The policeman was chasing the thief. He turned on the siren.’
- b. Policajac je ganjao lopova. Ukrao je dijamante.  
 Policeman.NOM is chasing thief.ACC. *pro* stole is diamonds.  
 ‘The policeman was chasing the thief. He stole the diamonds.’
- c. Policajac je ganjao lopova. On je upalio sirenu.  
 Policeman.NOM is chasing thief.ACC. *He* is turned siren.  
 ‘The policeman was chasing the thief. He turned on the siren.’
- d. Policajac je ganjao lopova. On je ukrao dijamante.  
 Policeman.NOM is chasing thief.ACC. *He* is stole diamonds.  
 ‘The policeman was chasing the thief. He stole the diamonds.’

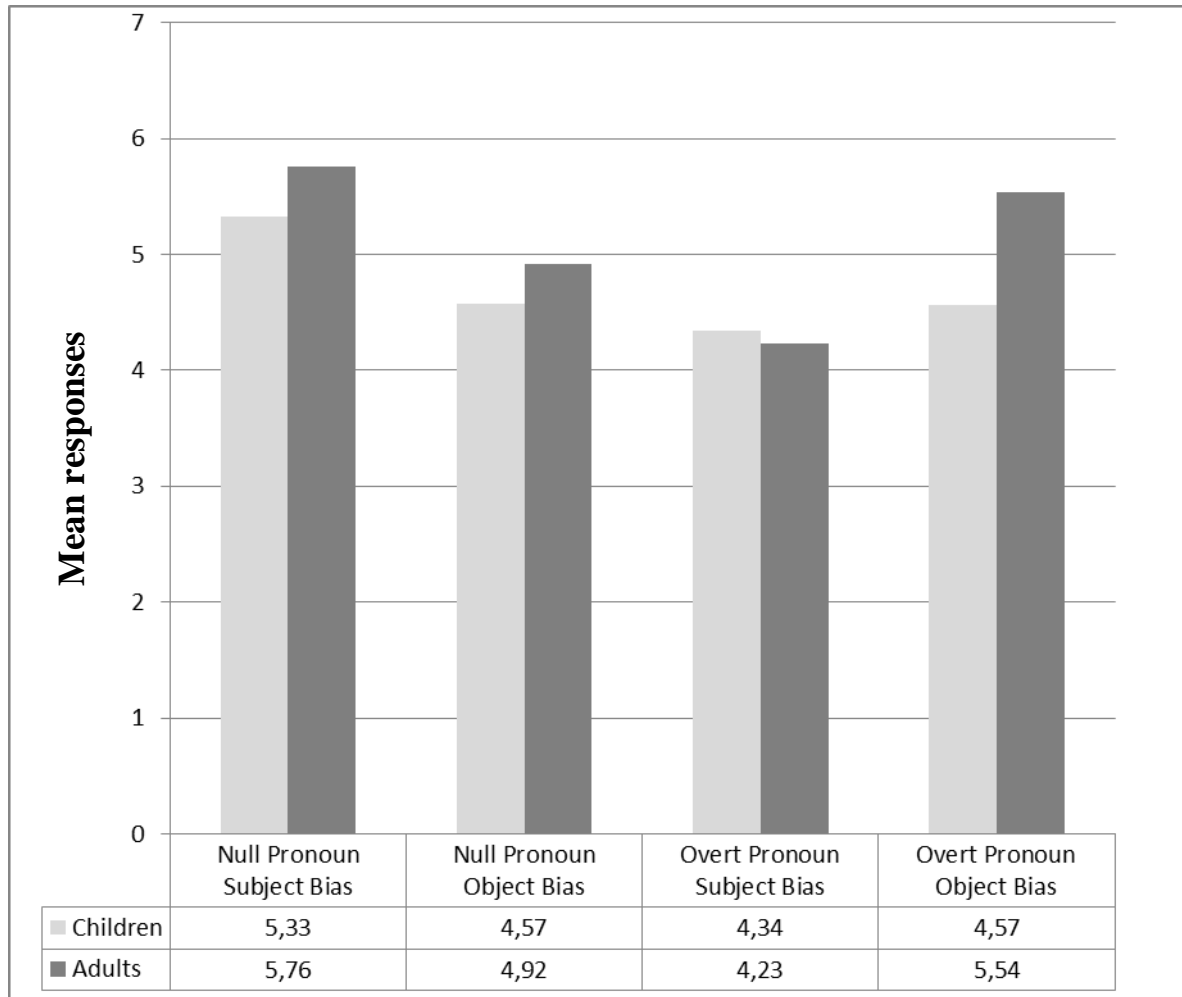
This shows how the variations of the same sentence in terms of null/overt pronoun use and object/subject bias were used to test each of the four conditions; (3a) tests the Null Pronoun Subject Bias condition, (3b) tests the Null Pronoun Object Bias condition, (3c) tests the Overt Pronoun Subject Bias condition and (3d) tests the Overt Pronoun Object Bias condition.

It is important to note here that each of the groups comprised an equal amount of experimental sentence pairs (7) for each of the four conditions. Each variation would appear in the exact same spot across the presentation lists in the order of sentences which was pre-randomized.

The children were tested in a quiet classroom while the part of the study including adults was carried out online, with assurance that there would be no collaboration between the participants. There was no time constraint imposed. The questionnaire took approximately 10 minutes to fill out while the actual testing took approximately 30 minutes for children, while the adults reported lower times needed to complete the test but the difference was not particularly noteworthy.

## 4.4 Results

The results of the study are shown in Figure 1. The values in the figure represent mean responses of both child and adult participants for each of the conditions tested in this study.



**Figure 1. Mean responses of child and adult participants for each experimental condition**

We can see in the Figure that both children and adults prefer the subject as the antecedent of the null pronoun. When it comes to the overt pronoun interpretation, adults favor the object antecedent, while children do not exhibit a clear preference for either the

subject or the object antecedent, even though the mean values they assigned to the sentences with the object bias are somewhat higher than the values they assigned to the sentences with the subject bias.

This finding is obvious from the results which suggest that experimental items which included a null pronoun and were pragmatically disambiguated towards the subject (Null Pronoun Subject Bias condition) and items which included an overt pronoun and were pragmatically disambiguated towards the object (Overt Pronoun Object Bias condition) made more sense for the participants than the items which included a null pronoun and were disambiguated towards the object (Null Pronoun Object Bias) and those which included an overt pronoun with disambiguation towards the subject (Overt Pronoun Subject Bias) respectively.

In order to compare the responses of the two groups of participants I conducted a repeated-measures ANOVA on the mean responses of each participant in each condition (null pronoun subject bias, null pronoun object bias, overt pronoun subject bias, overt pronoun object bias). Pronoun type (null, overt) and response bias (subject, object) were within-subjects factors and participant group (child, adult) was a between-subjects factor. In the ANOVA there was a significant main effect of pronoun type ( $F(1,54) = 14.562, p < .001$ ), suggesting that the two types of pronouns were responded to differently. A significant interaction between of pronoun type and response bias ( $F(1,54) = 36.182, p < .001$ ) indicates that the two types of pronouns were biased towards different responses. There was also a significant interaction between pronoun type, response bias and participant group ( $F(1,54) = 5.085, p < .05$ ), indicating that the two groups differed with respect to the response bias they expressed towards the two types of pronouns.

In order to investigate what the difference consisted in, I conducted two repeated-measures ANOVAs with pronoun type (null, overt) and response bias (subject, object) as within-subjects factors, for each participant group separately. In the ANOVA conducted on the child responses, there was a significant main effect of pronoun type ( $F(1,27) = 7.265$ ,  $p < .05$ ) and a significant interaction between pronoun type and response bias ( $F(1,27) = 8.692$ ,  $p < .05$ ). This suggests that children responded to the two types of pronouns differently and that their responses to the two types of pronouns were different with respect to the response bias. The difference between the two types of response biases was significant for the null pronoun ( $t = 2.685$ ,  $df = 27$ ,  $p < .05$ ), but not for the overt pronoun. This indicates that the response bias was present for the null pronoun, but not for the overt pronoun.

In the ANOVA conducted on the adult responses, the main effect of pronoun type ( $F(1,27) = 7.355$ ,  $p < .05$ ) and the interaction between pronoun type and response bias ( $F(1,27) = 28.818$ ,  $p < .001$ ) were also significant. A significant difference between the two types of response biases for both the null pronoun ( $t = 2.708$ ,  $df = 27$ ,  $p < .05$ ) and the overt pronoun ( $t = -4.776$ ,  $df = 27$ ,  $p < .001$ ) indicates that the adults had a response bias for both types of pronouns.

The results of statistical analysis thus confirm that both child and adult speakers of Croatian exhibit preference for associating the null pronoun with the subject antecedent, while only the adults display a bias for the object as the antecedent of the overt pronoun. However, there are certain indications that children are developing adult-like behavior with respect to the overt pronoun interpretation.



## 5 Discussion

The aim of the present study was to determine the strategy that adult monolingual speakers of Croatian language adopt when interpreting forward anaphora in inter-sentential contexts disambiguated by pragmatics. The prediction was that they are more likely to associate the null pronoun with the subject antecedent and the overt pronoun with the object antecedent, even though such tendencies have only been proven for Croatian in ambiguous intra-sentential contexts. Another goal was to examine whether the child speakers of Croatian (mean age 13.8) will display adult-like behavior in terms of the overt pronoun interpretation. Previous studies have shown that children up to age of 12 do not exhibit such behavior and are more flexible in terms of overt pronoun interpretation. In this case, the prediction was that the overt pronoun antecedent preferences of child participants will resemble those observed in adults to a greater extent than those reported for their younger counterparts, but that full acquisition of adult-like behavior in this regard will not yet be reached even at this age.

The basis of this study was provided by the PAS, originally established by Maria Carminati for the Italian language. The main postulate of the theory is that speakers of *pro*-drop languages are generally most prone to associate the null pronoun with the subject and associate the overt pronoun with the object. The theory gained support through a number of experiments which predominantly tested it in ambiguous intra-sentential contexts, but the theory has proven to hold ground across other contexts and *pro*-drop languages such as Croatian and Spanish as well. Based on empirical evidence that differences between intra-sentential and inter-sentential contexts do not play a key role in pronoun interpretation (Champollion, 2006) and on the finding that pragmatic disambiguation does not significantly affect the pronoun interpretation strategy (Hudson-D’Zmura & Tanenhaus, 1998) the

prediction was that Croatian monolingual speakers will act in line in PAS in inter-sentential contexts disambiguated by pragmatics.

The results of the study suggest that Croatian monolingual speakers indeed prefer associating the null pronoun with the subject antecedent and overt pronoun with the object precedent, even in pragmatically disambiguated contexts, as was predicted. This means that PAS applies to Croatian not only in ambiguous intra-sentential contexts, but in unambiguous inter-sentential contexts as well.

Croatian children also show clear preference for the subject antecedent when interpreting the null pronoun in this context; however, they are not more likely to associate the overt pronoun with the object than with the subject which suggests that they have not acquired adult-like behavior in terms of overt pronoun interpretation even at the age of 13.8.

It is also worth mentioning that certain flexibility in null pronoun interpretation in forward anaphora has been noted in Croatian monolingual speakers in one of the previous experiments (Kraš & Stipeć, 2013) which is in line with the behavior Italian speakers demonstrate (Belletti et al., 2007, Serratrice, 2007, Sorace & Filiaci, 2006, Tsimpli et al., 2004). However, no such flexibility has been noted in this study, as in Kraš (2008) who concluded that Croatian monolingual speakers act in line with the PAS in terms of the null pronoun interpretation.

## 6 Conclusion

This thesis describes the findings of a study the focal point of which was determining the strategies that Croatian monolingual speakers employ while resolving anaphoric relations in inter-sentential contexts disambiguated by pragmatics. The key motivation for conducting such a study was the fact that these strategies have only been examined in intra-sentential ambiguous contexts, so this was the first study of this type carried out in collaboration with Croatian speaking participants.

The fact that the findings suggest that Croatian monolingual speakers indeed do act in agreement with the PAS, even in contexts in which the theory is not commonly assessed (inter-sentential vs. intra-sentential; unambiguous contexts vs. ambiguous contexts), further supports relevance of the PAS in the psycholinguistic theory of anaphora resolution. The implications of this finding is that the PAS holds across a wider variety of contexts, at least when it comes to Croatian. Further studies including unambiguous inter-sentential contexts would need to be conducted to see whether this is true in other *pro*-drop languages as well.

The study also partially touched upon the issue on the age at which children adopt adult-like behavior in terms of the overt pronoun interpretation, the findings on which have not been conclusive thus far both for Croatian and Italian. The study has shown that the child speakers of Croatian still do not interpret the overt pronoun in an adult-like fashion even at the age of 14 (mean age of children participants was 13.8). Older children need to be tested to determine the age at which overt pronouns are interpreted in an adult-like manner.

Although the findings of this study may be considered indicative of how Croatian speakers interpret null and overt pronouns in unambiguous contexts, it should not be regarded as conclusive since further research on this topic is required. Introducing various other

methodological approaches, for example online tasks including self-paced reading or eye-tracking could provide another perspective on this matter and give deeper insight on how null and overt pronouns are interpreted in inter-sentential contexts disambiguated by pragmatics.

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# Appendix

## 1. Questionnaires

### 1.1. Questionnaire (Adults)

Datum: \_\_\_\_\_

#### UPITNIK

##### 1. DIO: Opći podaci

1. Ime i prezime:

\_\_\_\_\_

2. Spol:        M        Ž

3. Dob: \_\_\_\_\_

4. Mjesto rođenja: \_\_\_\_\_

5. Gdje trenutno živite? \_\_\_\_\_

6. Koju ste školu ili fakultet završili?

\_\_\_\_\_

7. Koje je Vaše zanimanje? \_\_\_\_\_

8. Jeste li trenutno negdje zaposleni? DA    NE

Ako da, gdje i na kojem radnom mjestu? \_\_\_\_\_

9. Studirate li trenutno?        DA    NE

Ako da, što i na kojem fakultetu? \_\_\_\_\_

##### 2. DIO: Informacije o poznavanju jezika

1. Koji Vam je materinski jezik, tj. kojem ste jeziku bili izloženi od rođenja? Ako imate dva materinska jezika, navedite ih oba.

\_\_\_\_\_



2. Govorite li još neki dijalekt hrvatskog jezika? DA NE

Ako da, koji? \_\_\_\_\_

S kime ga govorite? \_\_\_\_\_

3. Govorite li neki strani jezik? DA NE

Ako da koji/e? Ako govorite više stranih jezika, poredajte ih redoslijedom od onoga koji najbolje poznajete do onog koji najslabije poznajete

\_\_\_\_\_

4. Za svaki od stranih jezika koji govorite, odgovorite na pitanja u tablici.

JEZIK 1	
S koliko ste godina počeli učiti jezik?	
Kako ste učili jezik?	
Koristite li svakodnevno jezik? Ako da, u kojim situacijama?	
Jeste li ikad živjeli dulje od mjesec dana u zemlji u kojoj se jezik govori? Ako da, kolikom dugo i s kojom svrhom?	

JEZIK 2	
S koliko ste godina počeli učiti jezik?	
Kako ste učili jezik?	
Koristite li svakodnevno jezik? Ako da, u kojim situacijama?	

Jeste li ikad živjeli dulje od mjesec dana u zemlji u kojoj se jezik govori? Ako da, kolikom dugo i s kojom svrhom?	
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JEZIK 3	
S koliko ste godina počeli učiti jezik?	
Kako ste učili jezik?	
Koristite li svakodnevno jezik? Ako da, u kojim situacijama?	
Jeste li ikad živjeli dulje od mjesec dana u zemlji u kojoj se jezik govori? Ako da, kolikom dugo i s kojom svrhom?	

## 1.1. Questionnaire (Children)

Datum: \_\_\_\_\_

### UPITNIK

#### PRVI DIO: Opće informacije

1. Ime i prezime: \_\_\_\_\_
2. Spol:                    M                    Ž
3. Dob: \_\_\_\_\_
4. Mjesto rođenja: \_\_\_\_\_
5. Razred: \_\_\_\_\_
6. U kojem mjestu živiš? \_\_\_\_\_
7. Jesi li ikad živio/la negdje drugdje osim u Međimurju?                    DA                    NE  
Ako da, gdje? \_\_\_\_\_  
U kojem razdoblju? \_\_\_\_\_

#### DRUGI DIO: Informacije o jezicima

1. Koji je tvoj materinski jezik, tj. kojem si jeziku izložen od rođenja? Ako imaš dva materinska jezika, navedi oba.  
\_\_\_\_\_
2. Govoriš li neki dijalekt hrvatskog jezika?                    DA                    NE  
Ako da, koji? \_\_\_\_\_  
S kime ga govoriš? \_\_\_\_\_
3. Koju si ocjenu imao/la iz hrvatskog na polugodištu?    1            2            3            4            5
4. Koji/e strane jezike učiš? \_\_\_\_\_  
\_\_\_\_\_

S koliko si godina počeo/la učiti taj/te jezik(e)?

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5. Ako učiš više stranih jezika, poredaj ih redosljedom od onoga koji najbolje poznaješ do onoga koji najslabije poznaješ.

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## 2. Grading scale task items

### 2.2. Experimental items

1. a Dječak je susreo nasilnika. Pozvao je upomoć.
1. b Dječak je susreo nasilnika. On je pozvao upomoć.
1. c Dječak je susreo nasilnika. Imao je nož.
1. d Dječak je susreo nasilnika. On je imao nož.
  
2. a Policajac je ganjao lopova. Upalio je sirenu.
2. b Policajac je ganjao lopova. On je upalio sirenu.
2. c Policajac je ganjao lopova. Ukrao je dijamante.
2. d Policajac je ganjao lopova. On je ukrao dijamante.
  
3. a Sudac je gledao optuženika. Izrekao je presudu.
3. b Sudac je gledao optuženika. On je izrekao presudu.
3. c Sudac je gledao optuženika. Priznao je krivnju.
3. d Sudac je gledao optuženika. On je priznao krivnju.
  
4. a Djedica je ugledao razbojnika. Nazvao je policiju.
4. b Djedica je ugledao razbojnika. On je nazvao policiju.
4. c Djedica je ugledao razbojnika. Nosio je pištolj.
4. d Djedica je ugledao razbojnika. On je nosio pištolj.
  
5. a Redar je uočio vandala. Napisao je prijavu.
5. b Redar je uočio vandala. On je napisao prijavu.
5. c Redar je uočio vandala. Uništavao je klupicu.
5. d Redar je uočio vandala. On je uništavao klupicu.
  
6. a Blagajnik je pozdravio kupca. Izdao je račun.
6. b Blagajnik je pozdravio kupca. On je izdao račun.
6. c Blagajnik je pozdravio kupca. Izvadio je novčanik.
6. d Blagajnik je pozdravio kupca. On je izvadio novčanik.
  
7. a Konobar je otpratio gosta. Skinuo je pregaču.
7. b Konobar je otpratio gosta. On je skinuo pregaču.
7. c Konobar je otpratio gosta. Ostavio je napojnicu.
7. d Konobar je otpratio gosta. On je ostavio napojnicu.
  
8. a Biciklist je zaobilazio smetlara. Pritisnuo je zvonce.
8. b Biciklist je zaobilazio smetlara. On je pritisnuo zvonce.
8. c Biciklist je zaobilazio smetlara. Meo je ulicu.
8. d Biciklist je zaobilazio smetlara. On je meo ulicu.
  
9. a Agent je uhvatio sumnjivca. Pokazao je značku.
9. b Agent je uhvatio sumnjivca. On je pokazao značku.
9. c Agent je uhvatio sumnjivca. Pružio je otpor.
9. d Agent je uhvatio sumnjivca. On je pružio otpor.
  
10. a Vozač je promatrao prometnika. Otvorio je prozor.

10. b Vozač je promatrao prometnika. On je otvorio prozor.  
 10. c Vozač je promatrao prometnika. Dignuo je palicu.  
 10. d Vozač je promatrao prometnika. On je dignuo palicu.
11. a Carinik je pregledavao putnika. Pronašao je drogu.  
 11. b Carinik je pregledavao putnika. On je pronašao drogu.  
 11. c Carinik je pregledavao putnika. Ispraznio je džepove.  
 11. d Carinik je pregledavao putnika. On je ispraznio džepove.
12. a Zaštitar je opazio provalnika. Oglasio je uzbunu.  
 12. b Zaštitar je opazio provalnika. On je oglasio uzbunu.  
 12. c Zaštitar je opazio provalnika. Obijao je sef.  
 12. d Zaštitar je opazio provalnika. On je obijao sef.
13. a Mađioničar je odabrao gledatelja. Izveo je trik.  
 13. b Mađioničar je odabrao gledatelja. On je izveo trik.  
 13. c Mađioničar je odabrao gledatelja. Saslušao je upute.  
 13. d Mađioničar je odabrao gledatelja. On je saslušao upute.
14. a Kućepazitelj je nadzirao vodoinstalatera. Platilo je popravak.  
 14. b Kućepazitelj je nadzirao vodoinstalatera. On je platilo popravak.  
 14. c Kućepazitelj je nadzirao vodoinstalatera. Popravljao je cijev.  
 14. d Kućepazitelj je nadzirao vodoinstalatera. On je popravljao cijev.
15. a Recepcionarka je upisivala gošću. Zatražila je osobnu iskaznicu.  
 15. b Recepcionarka je upisivala gošću. Ona je zatražila osobnu iskaznicu.  
 15. c Recepcionarka je upisivala gošću. Dala je osobne podatke.  
 15. d Recepcionarka je upisivala gošću. Ona je dala osobne podatke.
16. a Učiteljica je ispitivala učenicu. Čekala je odgovor.  
 16. b Učiteljica je ispitivala učenicu. Ona je čekala odgovor.  
 16. c Učiteljica je ispitivala učenicu. Imala je tremu.  
 16. d Učiteljica je ispitivala učenicu. Ona je imala tremu.
17. a Prodavačica je posluživala djevojčicu. Prerezala je kruh.  
 17. b Prodavačica je posluživala djevojčicu. Ona je prerezala kruh.  
 17. c Prodavačica je posluživala djevojčicu. Odabrala je sladoled.  
 17. d Prodavačica je posluživala djevojčicu. Ona je odabrala sladoled.
18. a Liječnica je pregledala bolesnicu. Postavila je dijagnozu.  
 18. b Liječnica je pregledala bolesnicu. Ona je postavila dijagnozu.  
 18. c Liječnica je pregledala bolesnicu. Imala je bronhitis.  
 18. d Liječnica je pregledala bolesnicu. Ona je imala bronhitis.
19. a Prosjakinja je zaustavila prolaznicu. Tražila je novac.  
 19. b Prosjakinja je zaustavila prolaznicu. Ona je tražila novac.  
 19. c Prosjakinja je zaustavila prolaznicu. Okrenula je glavu.  
 19. d Prosjakinja je zaustavila prolaznicu. Ona je okrenula glavu.

20. a Voditeljica je predstavljala sportašicu. Pobrkala je tekst.  
20. b Voditeljica je predstavljala sportašicu. Ona je pobrkala tekst.  
20. c Voditeljica je predstavljala sportašicu. Osvojila je medalju.  
20. d Voditeljica je predstavljala sportašicu. Ona je osvojila medalju.
21. a Šefica je ukorila zaposlenicu. Zahtijevala je točnost.  
21. b Šefica je ukorila zaposlenicu. Ona je zahtijevala točnost.  
21. c Šefica je ukorila zaposlenicu. Susprezala je suze.  
21. d Šefica je ukorila zaposlenicu. Ona je susprezala suze.
22. a Novinarka je intervjuirala političarku. Vodila je bilješke.  
22. b Novinarka je intervjuirala političarku. Ona je vodila bilješke.  
22. c Novinarka je intervjuirala političarku. Izbjegavala je odgovor.  
22. d Novinarka je intervjuirala političarku. Ona je izbjegavala odgovor.
23. a Obožavateljica je prepoznala pjevačicu. Izvadila je fotoaparat.  
23. b Obožavateljica je prepoznala pjevačicu. Ona je izvadila fotoaparat.  
23. c Obožavateljica je prepoznala pjevačicu. Davala je autograme.  
23. d Obožavateljica je prepoznala pjevačicu. Ona je davala autograme.
24. a Pacijentica je posjetila zubaricu. Imala je zubobolju.  
24. b Pacijentica je posjetila zubaricu. Ona je imala zubobolju.  
24. c Pacijentica je posjetila zubaricu. Dezinficirala je pribor.  
24. d Pacijentica je posjetila zubaricu. Ona je dezinficirala pribor.
25. a Djevojka je nazvala frizerku. Zatražila je termin.  
25. b Djevojka je nazvala frizerku. Ona je zatražila termin.  
25. c Djevojka je nazvala frizerku. Čistila je salon.  
25. d Djevojka je nazvala frizerku. Ona je čistila salon.
26. a Nadzornica je pozvala čistačicu. Imala je primjedbu.  
26. b Nadzornica je pozvala čistačicu. Ona je imala primjedbu.  
26. c Nadzornica je pozvala čistačicu. Odložila je metlu.  
26. d Nadzornica je pozvala čistačicu. Ona je odložila metlu.
27. a Korisnica je kontaktirala tele-operaterku. Imala je prigovor.  
27. b Korisnica je kontaktirala tele-operaterku. Ona je imala prigovor.  
27. c Korisnica je kontaktirala tele-operaterku. Zaprimala je pritužbu.  
27. d Korisnica je kontaktirala tele-operaterku. Ona je zaprimala pritužbu.
28. a Studentica je dozvala konobaricu. Naručila je pizzu.  
28. b Studentica je dozvala konobaricu. Ona je naručila pizzu.  
28. c Studentica je dozvala konobaricu. Zapisala je narudžbu.  
28. d Studentica je dozvala konobaricu. Ona je zapisala narudžbu.

## 2.2. Fillers

1. Taksist je otvorio vrata. Putnici su izašli.
2. Starica je zatvorila kišobran. Stala je kiša.
3. Mladić je tražio psa. Kućica je bila prazna.
4. Stanarka je zatekla obijenu bravu. Stigla je policija.
5. Izbacivač je zaustavio posjetitelja. Ulaz se naplaćivao.
6. Atletičarka je iščekivala start. Začuo se pucanj.
7. Vlasnik je prao auto. Žena mu je donijela spužvu.
8. Muškarac je ozlijeđen. Dogodila se prometna nesreća.
9. Sluškinja je izvršila zadatak. Soba je blistala.
10. Profesor je šetao razredom. Pisao se test.
11. Nastavnica je tražila mir. Djeca su utihnula.
12. Mehaničar je tražio alat. Odvijač mu je pao pod auto.
13. Klizačica je bila nesigurna. Klizaljke su bile rasklimane.
14. Polaznica je pratila nastavu. Bilo je zanimljivo.
15. Vodič je nosio plavi kišobran. Turisti su ga slijedili.
16. Manekenka je hodala pistom. Kreacija je bila elegantna.
17. Kradljivac je opljačkao obitelj. Policija je tragala za njim.
18. Serviser je popravljao računalo. Monitor nije radio.
19. Gimnastičarka je izvodila vježbu. Suci su je ocjenjivali.
20. Kuharica je bila u žurbi. Trebalo je još počistiti kuhinju.
21. Začulo se zvono. Završio je školski sat.
22. Potraga je bila neuspješna. Auto nije pronađen.
23. Izbio je požar. Zavladao je pomutnja.
24. Natjecanje je bilo neregularno. Rezultati su poništeni.
25. Slika je bila prekrasna. Svi su joj se divili.
26. Promet je bio zakrčen. Auti su se jedva micali.
27. Koncert je bio dobro posjećen. Karte su bile rasprodane.
28. Momčad je dobro odigrala. Navijači su bili euforični.
29. Učenik je pisao zadaću. Počeli su praznici.
30. Vrtlar je sadio cvijeće. Padao je snijeg.
31. Tapetar je posjetio stanare. Zajedno su ispekli kolač.
32. Epidemija se proširila. Nije bilo bolesnih.
33. Grad je obasjalo sunce. Padao je mrak.
34. Zaposlenica je kasnila na posao. Povećali su joj plaću.
35. Pješak je prelazio cestu. Pukla mu je guma.
36. Dječak je gledao kroz prozor. Rolete su bile spuštene.
37. Informatičar je pokrenuo aplikaciju. Računalo je bilo ugašeno.
38. Planinarka je osvajala vrh. Putem je izgubila peraje.
39. Dadilja je budila djetešce. Moralo je stići na posao.
40. Menadžer je spasio kompaniju. Uručen mu je otkaz.
41. Žrtva je preminula. Počinitelj je oslobođen.
42. Pilot je upravljao avionom. Zapljuskivala ga je voda.
43. Budilica je zazvonila. Probudio je sve u kući.
44. Majka je posjetila kćeri. Kosa mu je bila zamršena.
45. Maloljetnik je kupio cigarete. Prodavali su ga u dućanu.
46. Blago je napokon pronađeno. Podijeljen je među grupom.
47. Kupac se bunio. Bilo joj je preskupo.



48. Radnik je bio ljut. Nije dobila plaću.
49. Student je probudio kolegu. Kasnile su na predavanje.
50. Potres je pogodio grad. Bila je razorne snage.
51. Djevojčica je ustala. Najprije se umio.
52. Gospođa je htjela platiti. Zaboravio je novčanik.
53. Dječčić je plakao. Bila je gladna.
54. Čistačica je čistila štednjak. Ispala mu je krpa.
55. Oko mu je bilo upaljeno. Nije mogla gledati.
56. Programer je pritiskao dugme. Bila je pokvareno.

### **2.3. Instructions**

On a scale from 1 to 7, grade how much sense the second sentence makes in relation to the first one, where:

- 1 – The second sentence makes absolutely no sense in relation to the first one.
- 7 – The second sentence makes perfect sense in relation to the first one.'