STUDIES IN LANGUAGE AND MIND 3

SELECTED PAPERS FROM THE 6TH & 7TH WORKSHOP ON *PSYCHOLINGUISTIC, NEUROLINGUISTIC AND CLINICAL LINGUISTIC RESEARCH*

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PREFACE

This volume, the third in the series *Studies in Language and Mind*, contains selected papers presented at the 6th and 7th Novi Sad workshop on *Psycholinguistic, neurolinguistic and clinical linguistic research*, held at the University of Novi Sad in April 2018 and 2019. As in past editions, the workshop gathered together a rising number of international senior and junior scientists seeking to understand language as a whole, from the physical substratum supporting it, to its acquisition, processing, and loss. In 2018 and 2019, the program of this yearly one-day event comprised 24 high-quality presentations of collaborative projects involving consolidated researchers and students from 13 European countries including Austria, Croatia, Cyprus, Denmark, France, Finland, Germany, Greece, Hungary, The Netherlands, Serbia, Slovenia, and the UK. We are delighted to see that the friendly atmosphere created in Novi Sad has not only provided the research community with a meeting place for the dissemination of state of the art research, but also for the exchange of new ideas and, very importantly, for networking. This is of especial relevance to us given the increased interest in multidisciplinary (experimental) approaches to language in linguistically non-impaired and impaired populations in the Slavic countries. We also want to highlight the enthusiasm of the early career researchers (MA and PhD students) and younger students, who embrace the event with eagerness and provide a force that keeps us moving year after year.

To promote their participation, ever since volume number 2, *Studies in Language and Mind* contains both scientific papers and shorter squibs aimed at the publication of bibliographical reviews and discussions about current unresolved topics of relevance. As in previous volumes, each of the manuscripts was peer reviewed by two experienced experts in the field. The current volume contains six chapters – five research papers and a squib – organized thematically in 4 parts: Part I includes studies of non-brain damaged adult participants, Part II includes contributions dealing with language acquisition, Part III focuses on acquired language disorders, while squibs are included in Part IV.

Part I: Studies on non-brain damaged adults

The opening chapter, *Time reference processing in Bosnian/Croatian/Serbian: An ERP study* by Ines Tokmacic and Srdjan Popov, reports on the results of two ERP experiments aimed at investigating auxiliaries in the present tense with either congruent past time reference or incongruent future time reference. The results are contrasted with those from other languages as well as with the offline results available in BCS. Differences are observed across experiments regarding the sentence final negativity for temporal violations detected in previous cross-linguistic ERP studies on time reference and in Experiment 1 alone. This is attributed to an increase in memory load in Experiment 2. Previous studies also reported a P600 effect, not found in BCS, that adds up to the discrepancy between online and offline results. The authors attribute these differences to the participants' prescriptivist education.

Part II: Language Acquisition

In her paper entitled *Tendencies in expressing verbal aspect in Gurbet Romani: a pilot experimental study with elementary-school children*, Mirjana Mirić reports on the results of a pilot study conducted with 7 Romani-Serbian bilingual children (aged 7 to 10), who were shown short non-verbal cartoons and asked to retell the content of the cartoons. The analysis of verbal aspect in the children's narratives reveals that the vast majority of verbs in the overall sample of Gurbet Romani verbs and Serbian loan verbs (morphologically adapted to Romani) are marked with a perfective marker and that those verbs which bear perfective markers mostly refer to completed events. These results confirm previous observations that perfective markers in Romani are typically used to refer to completed events, but the analysis also revealed some exceptions, suggesting that the choice of a verb form (perfective vs. non-perfective) might refer to the temporal dimension of an event, to its iterativity, or might serve narrative purposes.

In Chapter 3, *Reflexive and anti-causative verb production at different stages of language acquisition in Serbian*, Nina Ilić tests sixty subjects distributed across three age groups. By means of a structured interview with a verb elicitation task, she investigates the production of true reflexives, lexical reflexives and anti-causative *se*-verbs to contribute to the Continuity vs. Maturation debate in language acquisition. Whereas Serbian children showed no difficulty producing true or lexical reflexives, accuracy decreases with anticausative-verbs. These results are interpreted as a consequence of the detransitivization process involved in

anticausative-verbs and absent in reflexives and is taken as support for the Continuity Hypothesis.

Part III: Acquired language disorders

Part III opens with a chapter by Lennart Westergaard, Silvia Martínez-Ferreiro and Kasper Boye, *Is there a deictic vs. anaphoric pronoun dissociation in agrammatism?* The authors report on the results of semi-spontaneous speech of an individual with agrammatic aphasia and six non-brain-damaged subjects in order to investigate the difference between deictic and anaphoric pronouns in agrammatism. In line with previous studies, the results confirm that pronouns are not damaged *en block* in aphasia. The participant with agrammatism was found to produce fewer anaphoric pronouns than the controls, resulting in a significantly lower anaphoric-deictic ratio, whereas deictic pronoun production was not found to differ across populations. Westergaard, Martínez-Ferreiro and Boye account for these preliminary findings in terms of memory limitations. Given that agrammatism involves memory impairment, anaphoric pronouns, crucially depending on memory for reference resolution, are more impaired than deictic pronouns, which do not depend on memory resources to the same extent.

In *Bilingual strategies for aphasia: Evidence from typologically close languages*, co-authored by Silvia Martínez-Ferreiro and Kasper Boye, the reader is presented with an analysis of the use of code switching and code mixing by 2 bilingual Catalan-Spanish speakers with aphasias of the non-fluent type and two matched control individuals. Despite performance differences across the participants with aphasia, spontaneous speech data show that the introduction of isolated words in the non-target language is restricted to lexical words. The appearance of grammatical words in the non-target language seems to be limited to full constituents headed by a lexical word also in the non-target language. The authors attribute this asymmetry to differences in prominence and dependency properties between grammatical and lexical words (Boye & Harder, 2012), which are preserved in aphasia.

Part IV: Squibs

Finally, Sofie Theilmann Kristensen's squib, *Review: Subcortical structures, memory systems, and the grammar-lexicon divide*, gives an overview of an exhaustive research into PubMed in order to investigate whether the literature supports the associations proposed by Ullman's declarative/procedural model

(language processing – declarative memory – hippocampus and language processing – procedural memory – basal ganglia), based on the observation of cases of aphasia. The review highlights the complexity of determining the role of subcortical structures and emphasizes the need for further research, especially regarding the hippocampus and declarative memory. Additionally, it proposes the exploration of a new integrated model including pure neurobiological theories and usage-based linguistics departing from Ullman's model (Boye & Harder, 2017).

At the end of this preface, we would like to announce that the 8th Novi Sad workshop on *Psycholinguistic, neurolinguistic and clinical linguistic research* will be hosted by the Faculty of Philosophy, University of Novi Sad on April 25, 2020. We hope to welcome both early career and already established scientists eager to present the results of their research.

The Editors,
Novi Sad, November 2019

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The success of the Novi Sad workshops on *Psycholinguistic, neurolinguistic and clinical linguistic research* as well as the publication of this volume is due to many great people. The Editors would like to acknowledge the generous support of the Dean's Office of the Faculty of Philosophy. We wish to extend our gratitude to all those who helped make the workshop the success it was – our invited speakers, dr Seçkin Arslan (University of Groningen, The Netherlands) and Dr Vesna Stojanovik (University of Reading, United Kingdom) for the exciting lectures, all the speakers at the 6th and 7th Novi Sad workshop on *Psycholinguistic, neurolinguistic and clinical linguistic research* for bringing new perspectives to the field and the audiences for their interest and discussions at both editions.

We thank Professor Ivana Đurić Paunović, Head of the English Department and the Organizing Committee for their commitment and our enthusiastic volunteers for making it possible to enjoy these flawless events. We are grateful to the reviewers of this volume and to those who reviewed the individual papers for their time and constructive comments, which we believe have greatly improved the quality of this publication. Last but not least, we would like to thank all the contributors for sharing the results of their work with us and thus inspiring progress in this interdisciplinary field.

Part I: Studies on non-brain damaged adults

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TIME REFERENCE PROCESSING IN BOSNIAN/CROATIAN/SERBIAN: AN ERP STUDY

Abstract: Previous studies on time reference reported a P600 effect and sentence final negativities for temporal violations by simple and periphrastic verb forms (Baggio 2008; Bos, Dragoy, Stowe & Bastiaanse 2013; Dragoy, Stowe, Bos & Bastiaanse 2012; Qiu & Zhou 2012). The goal of the present study was to further investigate this phenomenon by examining a group of languages for which ERP data have not yet been reported. Typical language processing of time reference was examined in three South Slavic languages: Bosnian, Croatian, and Serbian (BCS). We report ERP data on the processing of future time reference violations in which the verb forms within the periphrastic construction do not match a time frame previously set by a temporal-lexical adverb. ERP responses to auxiliaries in the present tense with either congruent past time reference or incongruent future time reference were compared in two closely related experiments. Violations by a present tense verb in a past periphrastic construction yielded a negativity in the 700-1000 ms time window in Experiment 1, while no significant effect was observed in Experiment 2. The late negativity that occurred in Experiment 1 cannot be clearly attributed to time reference processing since this kind of effect has not been reported in previous studies. Based on several studies that found a similar effect and connected it to higher processing demands, we propose that the effect might be due to an increase in memory load. Regarding the absence of the P600 effect, we propose that time-reference violations in BCS may not be processed as fully ungrammatical when measured online, despite people judging them as ungrammatical in an offline judgement task. Such discrepancy between online and offline results may reflect the participants' prescriptivist education rather than their genuine language processing.

Key words: language processing**,** time reference, tense, discourse linking, event-related potentials, late negativity

1. Introduction

Every situation occurs at a certain time point and needs to be encoded in language. Since it is impossible to describe an event without a temporal perspective, time reference needs to be marked linguistically as well. Language offers a set of linguistic devices for specifying the temporal features of a situation. However, time is a cognitive phenomenon, which means that different languages can have different ways of expressing it linguistically (Jaszczolt & De Saussure 2013; Klein 2009). For instance, one can use a temporal-lexical adverb (e.g., *yesterday*) or tense markers on verbs (e.g., *ate, eats, will eat*) that indicate whether a situation is occurring before, during, or after some point in time. The grammatical category of tense, often expressed through verbal morphology in Indo-European languages, is one of the most common ways of encoding time in language. It is conventionally defined as "grammaticalized location in time" (Comrie 1985). However, there are also languages which do not possess the tense feature at all and express time reference through different devices. For instance, Mandarin Chinese expresses temporality based on interactions of lexical semantics, grammatical particles and discourse principles (Smith 2008; Qiu & Zhou 2012). The research on time reference in relation to the clinical field of language impairments has to do with a type of language disorder called aphasia, which occurs as a result of a focal brain lesion, usually caused by a cerebrovascular stroke (Kent 2004). Issues with time reference have predominantly been linked to agrammatism, a language deficit that often accompanies Broca's aphasia.[1] Agrammatism is exhibited in the form of slow, effortful, dysprosodic speech, the production of short utterances, and the frequent omission or substitution of grammatical morphemes and function words (Goodglass & Kaplan 1972). It was previously proposed that issues with time reference in agrammatism occur since reference to the past, as opposed to present and future, is difficult for agrammatic individuals because it is discourse-linked (Bastiaanse et al. 2011). In theoretical linguistics, there is a distinction between binding relations that are established within the sentence (e.g., relation between a reflexive and its antecedent) and discourse linking, which requires extrasentential information (e.g., the interpretation of *which*-questions). It is the accessing of this extrasentential information that seems to be problematic for individuals with agrammatism. The reasoning is based on previous research, specifically the claim that some elements, including tense, cannot be processed by narrow syntax alone

[1] Time reference has also been investigated for cases of fluent aphasia. For instance, see Dragoy and Bastiaanse (2013) and Kljajević and Bastiaanse (2011).

and require extra syntactic processing via discourse syntax (Avrutin 2006). Tense is used to denote a specific time frame, and according to Zagona (2003), discourse linking should be required for past tense, since the event described and the moment of speaking do not overlap. Bastiaanse et al. (2011) extended Zagona's (2003) theory to apply to all verbal morphology that refers to the past (including periphrastic verb forms), claiming that the issue goes beyond past tense and in fact concerns the broader subject of past time reference. This account is called the PAst DIscourse LInking Hypothesis, or PADILIH for short. The PADILIH has so far been tested in many different languages, with some data supporting the hypothesis, and some opposing it (Abuom & Bastiaanse 2013; Bastiaanse et al. 2011; Boss & Bastiaanse 2014; Dragoy & Bastiaanse 2013; Faroqi-Shah & Friedman 2015; Fyndanis et al. 2018; Kljajević & Bastiaanse 2011; Yarbay Duman & Bastiaanse 2009). Most of these studies report worse performance for the past time frame than for the present time frame. However, the case for future time reference is more complex, since many studies show that the future is processed with greater difficulty than the present but with less or equal difficulty when compared to the past.

1.1 ERP Studies on Time Reference

Although data from aphasia research mainly support the idea that it is time reference rather than tense that is impaired in agrammatic aphasia, it is still difficult to tease these two apart. Since it is not yet clear whether the issues with time reference in aphasia lie purely in the morphosyntactic properties of language or if it is in fact semantics/pragmatics that plays a pivotal role in this process, it is necessary to examine typical language processing. If there is indeed a difference between local binding vs. discourse-linking relations in time reference, neuroimaging methods can be of great help in uncovering it. If we use the electroencephalogram (EEG) to examine this issue, we would expect the distinction to result in different brain responses, that is, to be reflected in different EEG patterns. The EEG method is especially useful because it provides an excellent temporal resolution and detailed information about the processes under investigation (Stemmer & Connolly, 2011).

Event-related potentials (ERPs) are chunks of EEG signal, time-locked to a stimulus. ERPs are particularly useful because by their averaging, it is possible to obtain 'components'. Components represent "a neural signal that reflects coordinated neural network activity" (Arbib 2003: 412). Different components are

commonly elicited by creating semantic and syntactic violations in sentences. The three ERP components that were reported in previous research on time reference, and are therefore relevant for the current study, are the left anterior negativity (LAN), the P600, and the N400. The LAN is a negative-going component that peaks around 300-400 ms after stimulus onset. It is usually associated with the detection of morphosyntactic and word form violations (Neville, Nicol, Barss, Forster & Garrett 1991). The P600 is a positive-going deflection that occurs around 500 milliseconds after stimulus onset and is mostly linked to sentence reanalysis and repair processes (Kaan & Swaab 2003). The third component (the N400) is more semantic in nature. It is a negative-going wave that peaks at around 400 ms after the onset of a stimulus. It is typical of lexical-semantic integration difficulties (Kutras & Federmeier 2000; Kutas & Hillyard 1980). Late negativities also occurred in most studies on time reference. Specifically, these were sentence-final negativities, which were attributed to either additional processing demands, referential and integration difficulties, or repair and recomputation processes, depending on the study (Baggio, 2008; Dragoy, Stowe, Bos & Bastiaanse, 2012; Qiu & Zhou, 2012). In general, late negativities are frequently reported in sentence processing literature. Depending on their exact characteristics, they can be linked to difficulties with lexical (semantic) integration, higher processing demands, or an increase in memory load (Fiebach, Schlesewsky & Friederici 2001; Friederici, Steinhauer & Frisch 1999; King & Kutas 1995; Mecklinger, Schriefers, Steinhauer & Friederici 1995; Otten & Van Berkum 2009).

The most numerous and relevant ERP data on time reference processing have been reported for Dutch. Prior to this, only a small number of ERP studies have examined the agreement between temporal adverbials and verb tenses in Indo-European languages, and most of these focused on morphological processing rather than on time reference (Newman, Ullman, Pancheva, Waligura & Neville 2007; Steinhauer & Ullman 2002). The study by Baggio (2008) was the first to address this issue directly. He examined past time reference processing in Dutch using a simple verb form in the present tense, coupled with a past lexical adverb to create a violation. This resulted in a biphasic response consisting of a left anterior negativity (LAN) and a P600 time-locked to the main verb. Baggio (2008) appeals to semantic processes when discussing his findings. He claims the it is the mismatch between the semantic features of the adverb and the verb that influences the violation. To account for syntax-related ERP effects, he argues that verb tense can be seen as used correctly or incorrectly only based on a semantic criterion. Therefore, in his opinion, the check for temporal agreement is conducted entirely

within semantics. He proposes an integrated model of parsing and comprehension in which the processing of time reference is checked by the semantic processor, which acts as a preliminary stage of syntactic structure building. Additionally, Baggio (2008) found a sentence-final negativity in the violation condition, which he attributed to extra computational effort needed to generate a meaningful sentence.

The examination of time reference processing in Dutch continued with another two closely related ERP studies. They are directly linked to issues with temporal processing in aphasia and the PAst DIscourse LInking Hypothesis (PADILIH). The primary goal of the first study was to see if there is a difference between present and past time reference processing and provide evidence whether it is related to the distinction between locally bound and discourse-linked co-reference (Dragoy et al. 2012). The comprehension of time reference was examined in non-brain damaged native speakers of Dutch using two types of violation: violation with a lexical adverb referring to the past followed by a present tense verb and a violation with a lexical adverb referring to the present followed by a past tense verb. Embedded relative clauses were used because Dutch is a subject–object–verb language. Previous studies on morphosyntactic violations of locally bound pronominals most often elicited the P600 (Harris, Wexler & Holcomb 2000; Osterhout & Holcomb 1992), and this was expected to be the case for violations of past time context with the present tense. However, for discourse-linked elements, the literature reported so called 'referential negativities' with a latency of about 300 ms (Burkhardt 2007; Hammer, Jansma, Lamers & Münte 2008; Streb, Rösler & Hennighausen 1999), as well as sentence-final negativities (Osterhout & Mobley 1995). Coupled with previous ERP results obtained by Baggio (2008), Dragoy et al. (2012) expected to find the same or similar effects as previously reported in the literature. The results showed that the participants' brains responded to the violation of past time context by the present tense in the form of a P600 response time-locked to the target verb, as expected. However, present time reference violation by a past tense verb did not show any significant effect at all. Additionally, a sentence-final negativity was found in both experimental conditions. Based on the observed differences in their findings, the authors claim that processing of present and past time reference relies on qualitatively different neural processes.

The same group of authors investigated whether the ERP effects in Dragoy et al. (2012) were caused by tense morphology or time reference, since the two were not clearly distinguished in the study. Thus, Bos, Dragoy, Stowe, and

Bastiaanse (2013) decided to test violations using periphrastic verb forms with auxiliaries inflected for present tense. They contrasted two different present tense auxiliaries in the past context: *heeft* 'has' and *gaat* 'goes/will', and the past adverb *zonet* 'a-moment-ago' was used to establish the context of the time reference in both cases. Bos et al. (2013) claimed that this would enable the distinction to be made between tense and time reference, since periphrastic verb forms allow for a verb in present tense to be used for both past and future reference. They expected that a violation of a past time context with an incongruent present periphrastic verb form *gaat* 'will' would elicit a P600 time-locked to the auxiliary, as opposed to the congruent form *heeft* 'has'. This was indeed the case, since a violation of past reference by a present tense auxiliary *gaat* 'will' elicited the P600 effect. On the other hand, Bos et al. (2013) claim that there is no violation of local binding of the present tense when the auxiliary is part of a periphrastic construction that refers to the past (*heeft* 'has'). The discourse link can be successfully made in this case. They claim their findings to support the idea that it is time reference rather than tense that causes the positivity seen in the ERP responses. Compared to the two previous studies for Dutch (Baggio, 2008; Dragoy et al., 2012), no sentence-final negativity was found. However, Bos et al. (2013) argue that these negativities are not strictly specific to referential violations but have to do with processing difficulties in general.

Most of the studies that have investigated the neural correlates of time reference processing have examined Indo-European languages. However, there is one interesting case reported for Mandarin Chinese, a language in which verbs are not morphologically marked for tense but can be combined with temporal adverbs and aspectual particles to indicate time reference. Qiu and Zhou (2012) investigated how temporal information is processed in a tenseless language such as Chinese and whether the ERP effects would be different from those found in Indo-European languages. They used a sentence acceptability judgment task to investigate the processing of past and future reference. All sentences contained a temporal noun phrase with which the critical temporal markers agreed or disagreed. The temporal adverbs *cengjing* and *jiangyao/jianghui* were used for locating the event in the past and future, respectively. The aspectual marker *-guo* (typically refers to terminated past events, suffixed to the verb) was used in an additional condition. They found that both disagreeing temporal adverbs and the aspectual particle elicited a late centro-parietal positivity (P600). Additionally, the temporal adverbs evoked a negativity effect in the N400 time window. They also found a sustained negativity on the post-critical words and on the sentence-final words in

all sentences containing violations. The presence of the N400, and the P600 for future time violations, indicates that time reference processing in Mandarin Chinese differs in some respects from the results reported for Indo-European languages.

1.2 The Present Study

The overview of ERP research on time reference indicates that many questions still remain unanswered when it comes to typical language processing. It is difficult to determine whether past and non-past time reference can be seen as involving different neurocognitive processes, and whether discourse linking can indeed be recognized as a major factor in past time reference processing, when only a small number of studies have addressed this issue. Thus, the primary goal of the present study is to further investigate the processing of time reference by examining a group of languages for which ERP data have not yet been reported. Time reference processing is examined in three South Slavic languages, all of which have the same underlying grammar and are distinguished only by some minor differences. The three languages in question are Bosnian, Croatian, and Serbian (BCS). They do not differ in the way that time reference is expressed. Nonetheless, we have decided to make different versions for all the stimuli used in this study in order to avoid any potential effects that might be caused by lexical or dialectal differences.

Namely, when it comes to BCS, a distinction is made between the ikavian, ekavian, and (i)jekavian dialects. This distinction has to do with the historical development of the old Slavic vowel *jat* (Alexander, 2006; Sussex & Cubberley 2006). The letter used to be pronounced the same way in all three languages, but over the course of centuries the pronunciation changed in different regions (it developed into *i*, *e*, *je*, or *ije*). The pronunciation with *i* belongs to the ikavian dialect, and the one with *e* to the ekavian dialect. Additionally, the vowel is now pronounced as *je* or *ije* in the ijekavian dialect. Bosnian and Croatian have formally adopted the ijekavian dialect, while Serbian uses both ekavian and ijekavian pronunciation.[2] On the other hand, ikavian is not accepted as a standardized dialect in any of these languages but is not uncommon in certain areas of Croatia. Since the differences between the three languages are only minor, native speakers of

[2] Native speakers of Serbian who live in the Republic of Serbia officially use the ekavian dialect. However, native speakers of Serbian in Bosnia and Herzegovina use the ijekavian dialect with a mixture of lexical items typically found in Serbian.

Bosnian, Croatian, and Serbian can perfectly communicate with each other. Each of them would be able to read and comprehend any of the languages in question. Nonetheless, we have decided to make different versions for all the stimuli used in this study in order to avoid any potential effects that might be caused by lexical or dialectal differences. Thus, the stimuli were adapted to four different versions: Bosnian ijekavian, Croatian ijekavian, Serbian ekavian, and Serbian ijekavian.

The second goal is to compare the findings to previous results, especially those obtained by Bos et al. (2013), since this study will also be examining time reference through periphrastic verb forms. For that purpose, it was decided that two closely related experiments, which contain the same conditions and the same type of violation, will be presented. The only respect in which the two experiments differ is the type of filler items that are included. We suspect that one type of distractor sentences (subject-verb-complement fillers) might have an effect on how time reference violations will be perceived by the participants' brains. To be more exact, we want to see whether the violation will be reflected in an ERP component time-locked to the auxiliary or to the first disambiguating word following it.

In Bosnian/Croatian/Serbian (BCS), time reference can be established through several linguistic devices: tense (i.e. inflectional morphology for tense), aspect, temporal-lexical adverbs (e.g. *yesterday*, *now*, *tomorrow*), and adverbial phrases (e.g. *in a minute*, *after lunch*). Tense is marked on the finite verb form, either on the single lexical verb or on the auxiliary (for periphrastic verb forms). Apart from tense, the finite verb can also carry information about number, person, and aspect (1). However, the non-finite verb form within the periphrastic construction can also carry some grammatical information, for instance, be marked for aspect and gender (2). Adverbial phrases such as *svaki dan* (*every day*) in (1) and temporal-lexical adverbs such as *jučer* (*yesterday*) in (2) are often included for establishing the exact time reference of the situation.

(1) Mama pravi ručak svaki dan.
Mom make.PRES.IMPF.3SG lunch every day.
'Mom makes lunch every day.'

(2) Mama je jučer pravila ručak.
Mom AUX.PRES.3SG yesterday make.IMPF.FEM lunch.
'Mom was making lunch yesterday.'

The notion of grammatical aspect in BCS includes the distinction between the perfective and the imperfective, that is, the expression of a situation as a whole

vs. the expression of a situation as having an internal structure (Comrie 2001; Li & Shirai 2000). Perfective verbs in BCS involve past and future time reference, while the imperfective is used in all three time frames.[3] However, another important notion related to temporal processing is that of lexical aspect or Aktionsart, which concerns the semantic properties inherent in the lexical meaning of words, primarily verbs (Filip 2012). These lexical characteristics are directly related to temporal properties of those situations or events which the verbs describe. An important distinction is made between telic and atelic events, i.e. events which involve an intrinsic endpoint and events that can continue infinitely (Madden & Ferretti 2009). It is important to note that the choice of aspectual verbs in BCS and their grammatical classification into perfectives and imperfectives strongly depends on lexical semantics.

For the present study, we have decided to examine the processing of future time reference using violations with the past periphrastic verb form. The periphrastic form contains a third person singular auxiliary in the present tense (*je* 'be') and a non-finite lexical past participle verb marked for number, gender, and aspect. As a whole, the periphrastic form is used to refer to the past and is called the perfect tense *(perfekt)* in BCS. Both perfective and imperfective aspect can be marked on the lexical verb in the periphrastic construction. In this study, aspect was always kept constant in experimental sentences. We have chosen to encode the imperfective aspect on the main lexical verb because the imperfective can be used in all three time frames in BCS, which makes it the least marked aspectual value in these languages. A rich repertoire of past tenses used to be available in BCS. However, due to historical changes, many of these tense forms have become obsolete and are now used mostly in the literary sense. Therefore, the perfect tense (*perfekt*) was chosen because it is the most widespread in terms of usage nowadays. A temporal-lexical adverb was used to establish the time frame in experimental sentences, and the mismatch between the adverb and the periphrastic construction was expected to be perceived as a violation of time reference. Furthermore, we have done two similar experiments, different in all respects apart from the inclusion of subject-verb-complement (SVC) fillers in Experiment 2. This type of sentential construction also contains the verb *je* 'be', as does the past periphrastic verb form used in experimental sentences.

[3] For an extensive discussion on aspectual restrictions of verbs in Serbian, see Todorović (2015), since this applies to Bosnian and Croatian as well.

(3) Sutra je rođendan jednom poznatom piscu.
Tomorrow je.COPULA birthday one famous writer.
'Tomorrow is the birthday of a famous writer.'

However, here the verb *je* is not the auxiliary but the main verb in the sentence. The reason for including such fillers in Experiment 2 was to see if the participants would shift their focus from the auxiliary to either the word immediately following it, or to the main lexical verb. The idea was that, since sentences would be presented word by word on the screen, the participants would not be able to judge whether the sentence is congruent or incongruent solely based on the information they get from the lexical adverb and the auxiliary. They would have to see what follows next, which could in part mean that they are relying on the tenseless lexical verb for successfully establishing time reference. Although the past participle carries no tense inflection, it could be the case that it nonetheless encodes some type of temporal information. The reason for such a presupposition comes from several linguistic phenomena found in BCS. The first has to do with free word order. All three languages have the typical, most unmarked, SVO word order. However, words can be freely exchanged in the sentence so that almost any combination of constituents is possible. So, for instance, the past participle can be placed at the beginning of the sentence and be followed by an auxiliary as in:

(4) Pravila je mama ručak danas.
Make.IMPF.FEM AUX.PRES.3SG mom lunch today.
'Mom made lunch today.'

It could be claimed that such a sentence establishes the time frame even before the tensed auxiliary is observed. A further reason for this claim comes from sentences that contain reflexive verbs. In such cases, the auxiliary can be deleted for third person singular noun phrases, leaving only the main lexical past participle verb (5). This makes the construction somewhat comparable to a single verb form inflected for present tense, as in (6).

(5) Ona se ~~je~~ uspjela oporaviti.
She herself ~~AUX.~~PRES.3SG manage.PERF.FEM recover.
'She managed to recover.'

(6) On se raduje ponovnom sastanku.
He himself look forward to.IMPF.3SG next meeting.
'He is looking forward to the next meeting.'

Moreover, what is interesting about BCS is that there is a lot of flexibility when it comes to the usage of tenses meaning that some tense forms are not only restricted to a time frame. For instance, the present tense is commonly used for future time reference, as in (7). Also, the future tense can be used to refer to the past in subordinate clauses of the type shown in (8).

(7) Mama sutra ide u prodavnicu.
Mom tomorrow go.PRES.IMPF.3SG in store.
'Mom is going to the store tomorrow.'

(8) Rekao je da će jučer doći.[4]
Say.PERF.MASC AUX.PRES.3SG that will yesterday come.INF.
'He said he would come yesterday.'

When it comes to the perfect tense, it is usually restricted to the past time frame. However, it can sometimes be used to refer to the future in the narrative sense:

(9) Sutra(dan) je kupio novi automobil.
Tomorrow AUX.PRES.3SG buy.PRF.M new car.
'Tomorrow he bought a new car.'

Therefore, the interaction of the grammatical category of tense and time reference is much more complex in BCS.[5] This means that the violations of future time reference with a past tense form in BCS could be reflected in different ERP patterns than previously reported in the literature, or that they might not be observed on the neurocognitive level at all. Thus, in light of previous research on

[4] The sentence does not contain an overt subject. BCS is a pro-drop language.
[5] The usage of tense morphology for time reference is detailed in many BCS grammars; for instance, see Barić et al. (2005), Jahić, Halilović, and Palić (2000), and Klajn (2005) for separate grammars of each language, or Alexander (2006) for a detailed description of the languages in English.

time reference, and based on the characteristics described for languages under examination in this study, the following research questions have been formulated:

0. Will time reference violations in Bosnian/Croatian/Serbian indeed be observed as violations on the neurocognitive level?

If this happens to be the case, then the following questions apply:

1. At which level is time reference, and consequently time reference violations, processed in Bosnian/Croatian/Serbian (morphosyntactic, semantic/pragmatic)?
2. Are violations of future time reference with a past periphrastic verb form processed at the auxiliary, as reflected in the P600 time-locked to the present tense auxiliary in Experiment 1?
3. Does the inclusion of subject-verb-complement (SVC) fillers in Experiment 2 alter the processing strategy by delaying it to the first disambiguating word after the auxiliary? If so, the P600 should be time-locked to that word.

The claim that present tense (and reference) processing involves binding via morphosyntax implies that a tense violation should elicit a morphosyntactic processing pattern. Thus, in case the violation is indeed observed, we expect to find a P600 effect on the present tense auxiliary in Experiment 1, as was the case in Bos et al. (2013). Because of the inclusion of SVC fillers in Experiment 2, the P600 effect is hypothesized to occur on the first disambiguating word after the auxiliary. However, what could also happen is that the effect will not be observed at all, or that it will be reflected in different ERP components. This prediction has to do with the PADILIH and the results obtained by Dragoy at al. (2012) and Bos et al. (2013). If the past periphrastic verb form is indeed processed at the discourse level, and requires discourse linking as a whole, then the absence of an effect could be comparable to the absence of an effect for the Dutch simple past tense form used in the present context. Still, none of these studies looked at violations of the future context, so there is a chance that the effect might differ qualitatively.

2. Method

2.1 Participants

All participants recruited for this study were native speakers of Bosnian, Croatian, and Serbian. Seventeen participants were tested in total, one of which had to be excluded from the analysis due to strong artifacts in their EEG signal. Therefore, the ERP data of the remaining sixteen participants are reported in the results (mean age=26.8, age range: 18-38; SD=5.23, 9 females). All participants were right-handed and had normal or normal-to-corrected vision. None of them reported any previous or current speech or language disorders, nor any history of psychiatric and/or neurological disorders. Moreover, the participants confirmed that they did not use any substances (e.g. medication, alcohol, or drugs) that could influence their performance. All of them signed an informed consent prior to the experiment, which was approved by the Research Ethical Review Committee (CETO) of the Faculties of Arts, Philosophy, and Theology and Religious Studies of the University of Groningen. Each participant received €15 as compensation for participating in the experiment.

2.2 Materials

The stimuli for this research consisted of 240 sentences in total. They were equally distributed across two experiments. Each participant did both experiments and was presented with 80 experimental and 160 filler sentences in total. Experiment 1 contained 40 experimental sentences: congruent past reference with past tense (20 sentences) and incongruent future reference with past tense (20 sentences). A different set of 40 experimental sentences was included in the second experiment, all of them divided across the same levels as in Experiment 1 (see Table 1). In each sentence, a temporal-lexical adverb was used to mark the time frame in which the action occurs. Two different adverbs were used for past and future time reference, respectively: *yesterday*, *the day before yesterday*, *tomorrow*, and *the day after tomorrow*. The adverb was always placed at the beginning of the sentence and followed by a target auxiliary verb which remained constant in each case (*je* 'be'). The standard SVO structure came after the auxiliary, with the agent/subject always being a third person singular noun phrase. The periphrastic sentence frames contained different lexical items, differing in all respects apart from their structure.

Both experiments examined the same conditions (violation on the auxiliary and the word immediately following it). Thus, they also contained the same levels: congruent past and incongruent future. However, the experiments differed with respect to the type of filler items that were included. Experiment 1 contained 20 congruent future reference with future tense sentences (*will + infinitive* structure), while Experiment 2 contained 20 subject-verb-complement (SVC) sentences. Additionally, both experiments contained another type of filler items. These were sentences with and without aspectual violations. All sentences were matched on acceptability (acceptable, unacceptable) by means of conducting a validation survey prior to including the stimuli in the experiment. Ratings were obtained from 40 psychology students at the University of Sarajevo, all native speakers of Bosnian (mean age=19.8, SD=1.34, 34 females). Furthermore, experimental sentences were controlled for noun phrase animacy (the subject/agent was always animate, the direct object inanimate if possible), number of words (6-9 per sentence), syntactic structure (temporal lexical adverb followed by the target auxiliary + SVO sentence structure), and concreteness (no abstract nouns were used before the target verb). The experimental sentences always contained the same auxiliary (*be*) and a different main verb (38 transitive, 2 intransitive). The two intransitive verbs were followed by a prepositional phrase to compensate for length. Four different versions of the experiment were made for the four different dialects under investigation: Bosnian ijekavian, Croatian ijekavian, Serbian ijekavian, and Serbian ekavian. Each version was adapted by two native speakers of each language/dialect. For all four language versions, the stimuli were equally distributed across two lists per experiment (List A and List B), so that each list would contain only one version of the experimental sentences. Each list was further divided into 3 blocks of 40 sentences, and all stimuli appeared in a pseudo-randomized order.

Level	Example
Congruent	Jučer je vozač utovarao pakete u kamion. Yesterday AUX driver load packages in truck. 'The driver was loading the packages in the truck yesterday.'
Incongruent	Sutra je vozač utovarao pakete u kamion. Tomorrow AUX driver load packages in truck. '*The driver was loading the packages in the truck tomorrow.'

Table 1. Examples of experimental sentences

2.3 Procedure

The experimental paradigm was programmed and presented using a software tool E-Prime 2.0. The participants were seated in a quiet, dimly lit room in front of a computer screen at a distance of approximately 80 cm. They were given instructions about the experiment in both written and oral form. The participants' task was to silently read the sentences that were presented visually, word-by-word, in the middle of the screen in white against a black background (letter font: Arial, letter size: 24 pt). A practice trial that included 6 sentences preceded the experimental stimuli in order to familiarize the participants with the task. Each stimulus was preceded by a 500 ms fixation cross and followed by a 300 ms blank screen. Words were then presented for 300 ms, each followed by a blank screen of the same duration. To check for comprehension and to keep the participants alert, an acceptability judgment question appeared after each sentence (signaled by a question mark of infinite duration). The participants were instructed to read each sentence for comprehension and to respond with the 'p' or 'q' keyboard buttons, depending on whether the sentence was acceptable or not. The question mark disappeared after the participant made the response and was followed by a new sentence. The assignment of keyboard buttons was counterbalanced across participants. Each block lasted between 5-7 minutes, depending on how quickly the participants provided their responses. The participants were given an option to take a short break in between the blocks. The total testing time was approximately 1 hour and 30 minutes.

2.4 EEG Recording and Data Processing

The continuous electroencephalogram was recorded form 32 scalp electrodes (mounted on an elastic cap, WaveGuard original) using the eggo software (ANTneuro B.V., Enschede, Netherlands). An additional EOG electrode was placed above the left eyebrow to record eye movements. Electrode impedances were always kept below 10 kΩ. Data were acquired at 500 Hz sampling rate with the common average reference. The offline processing was done in Brain Vision Analyzer 2.1 (Brain Products, GmbH, Munich, Germany). Offline filtering was performed using a band-pass filter (0.1-30 Hz), followed by automatic eye blink correction. The data were segmented into epochs starting 200 ms before the onset of the critical word (the target verb) and lasting until 2000 ms post-word onset. The artifact rejection (+/−100 μV threshold) was performed only on a section of each epoch (-200 - 2000 ms) that was included in the statistical analysis. The data were

corrected relative to the 200 ms pre-stimulus baseline and were averaged per subject and per condition. All participants, except the one that was excluded, were above the threshold of 60% of averaged trials in all conditions.

2.5 Data Analysis

For the acceptability judgment task, the accuracy rate was computed as the percentage of correct responses. For EEG analysis, averaged values (in μV) were extracted per participant, per condition, and per region of interest. The scalp electrodes were divided into 9 regions of interest: left anterior (F7, F3, FC5), midline anterior (Fz, FC1, FC2), right anterior (F4, F8, FC6), left central (C3, CP5), midline central (Cz, CP1, CPz, CP2), right central (C4, CP6), left posterior (P7, P3, O1), midline posterior (Pz, POz), and right posterior (P4, P8, O2). Mean amplitudes were analyzed in five time windows (300–500 ms, 500–700 ms and 700–1000 ms, 1000-1200 ms, 1200-1500 ms). For the statistical analysis, repeated measures ANOVAs were used with the following within subject factors: congruency (2 levels: congruent and incongruent), hemisphere (2 levels: left and right hemisphere), and anteriority (3 levels: anterior, central, and posterior). A factor of target word time reference (auxiliary vs the following disambiguating word) was also employed. The significance level was set to $p < .05$. For each time window, 2 global repeated measures ANOVAs were performed; first for the lateral regions (all factors included), and then for the midline regions (factor hemisphere excluded). Follow-up ANOVAs were applied to those interactions that turned out at least marginally significant ($p<.1$). The Geisser and Greenhouse (1959) correction was applied in case the assumption of sphericity was violated. Only correctly judged trials were included in the analysis.

3. Results

3.1 Behavioral Results

The validation survey showed an overall high number of accurate responses for all experimental sentences. Only five had to be excluded based on native speaker judgment (12.5%). The cut-off value was set at 80%, meaning that the sentence had to be judged correctly by 8 out of 10 people in order to be included in the experiment. The number of accurate responses for the acceptability judgment question in Experiment 1 was also very high: congruent and incongruent sentences were judged correctly in 92.4% and 88.2% of the cases, respectively. The

numbers are almost the same for Experiment 2: 91.2% for congruent sentences and 89.4% for incongruent sentences.

Although the behavioral responses indicate that the participants were highly accurate in judging congruent vs incongruent sentences overall, there is still some individual variability that should be noted. The idividual accuracy results for Experiment 1 are presented in Figure 1. Only four participants scored at ceiling for both congruent and incongruent sentences. Fifteen participants had more than 80% correct responses for both levels; only two performed below this threshold (had a percentage of 70 and 78 correct responses, respectively). These two participants had a high accuracy rate for the congruent level (95% and 100%). However, they scored much lower on the incongruent level (45% and 55%).[6]

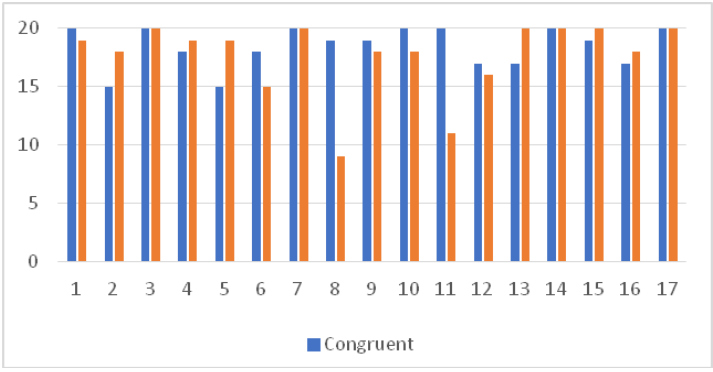

Figure 1. Individual accuracy results for Experiment 1: participants are plotted on the horizontal axis

A similar pattern of results can be observed for the second experiment. Only five participants scored at ceiling on both levels, while fourteen had more than 80% correct responses for both congruent and incongruent sentences combined. The participants who scored lower this time (P2=67%, P5=75%, and P16=75%) had a higher percentage of correct responses for both levels in Experiment 1. What is also interesting to observe is that one of these participants (P5) had a much lower accuracy for the congruent condition, while they performed at ceiling for the incongruent one. The variability in responses for Experiment 2 is visually presented in Figure 2.

[6] No participants were excluded from the ERP analysis based on the behavioral task. The ERP waveforms did not show any difference between the analysis with and without the two participants.

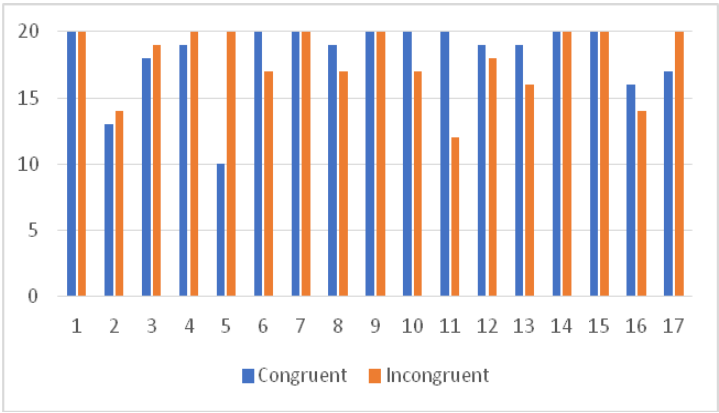

Figure 2. Individual accuracy results for Experiment 2: participants are plotted on the horizontal axis

3.2 ERP Results

In Experiment 1, the lateral analysis of the 700-1000 ms time window showed a main effect of congruency ($F(1, 15)=4.87$, $p < .05$), with incongruent sentences eliciting a more negative waveform than congruent ones. However, a visual analysis did not reveal a positive shift in the 500 -700 ms time window, as was expected. Scalp topographies for the most relevant time windows can be seen in Figure 3, while the ERP waveforms time-locked to the onset of the critical word (the auxiliary) across 9 regions of interest (ROIs) are shown in Figure 4.

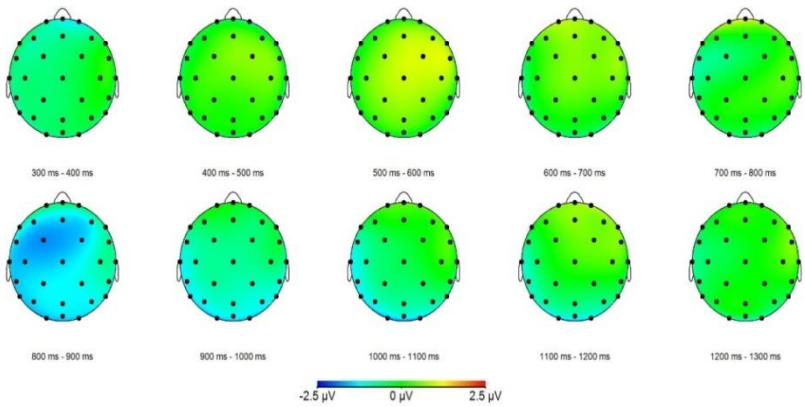

Figure 3. Topographic maps for Experiment 1 show a difference between congruent and incongruent sentence processing with the effect most strongly observed in the 800-900 ms time window

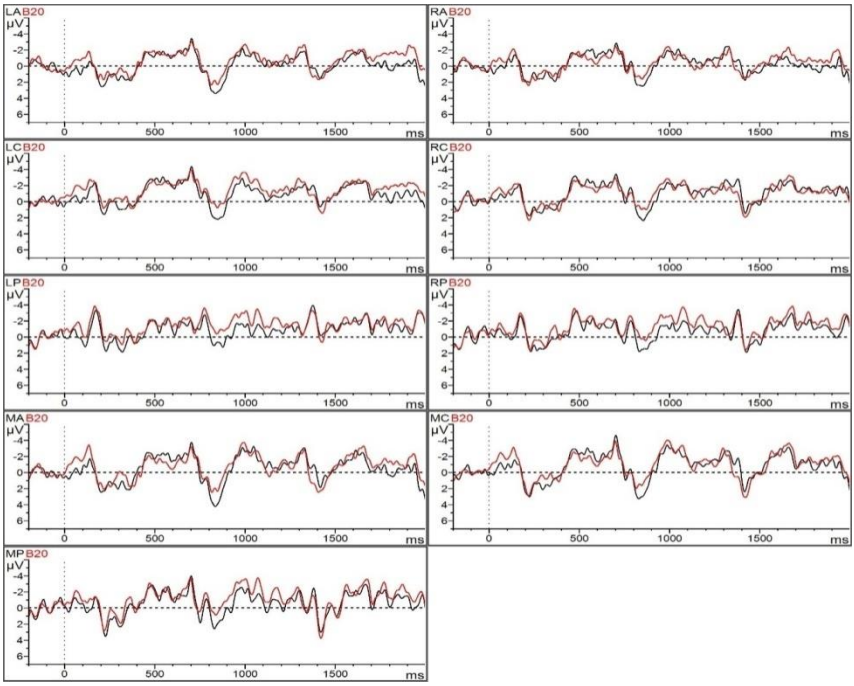

Figure 4. Grand average ERPs for the auxiliary condition across 9 ROIs in Experiment 1: black line represents congruent sentences and the red line represents incongruent sentences

For Experiment 2, in the lateral analysis of the 700-900 ms, there was a marginally significant three-way interaction between congruency, hemisphere and anteriority ($F(2, 30)=3.51$, $p < .1$). In the follow-up analysis, there were no significant effects (*p*s > .1). A marginally significant interaction between congruency and hemisphere was obtained for the lateral regions in the 1000-1200 ms time window ($F(1, 15)=4.03$, $p < .1$). The post-hoc tests did not yield any significant effect in this case either (*p*s > .1). In the midline analysis, an interaction between anteriority and congruency was marginally significant ($F(2, 30)=2.95$, $p < .1$), with no significant results in the post-hoc (*p*s < .1). Finally, in the last time window (1200-1500 ms), there was a close-to-significant effect of congruency in the lateral regions ($F(1, 15)=3.62$, $p < .1$). The relevant topographic maps and wave forms for the 9 ROIs for Experiment 2 are presented in Figure 5 and Figure 6.

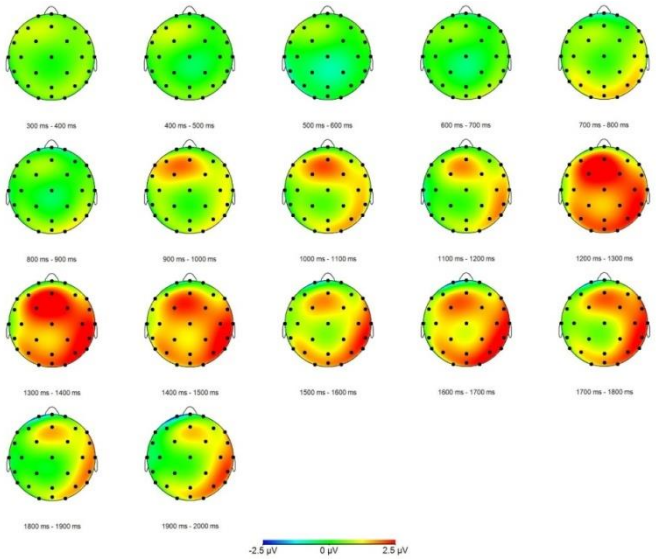

Figure 5. Topographic maps for Experiment 2: show a difference between congruent and incongruent sentence processing; the marginally significant late positivity can be observed starting from around 1000 ms post stimulus onset

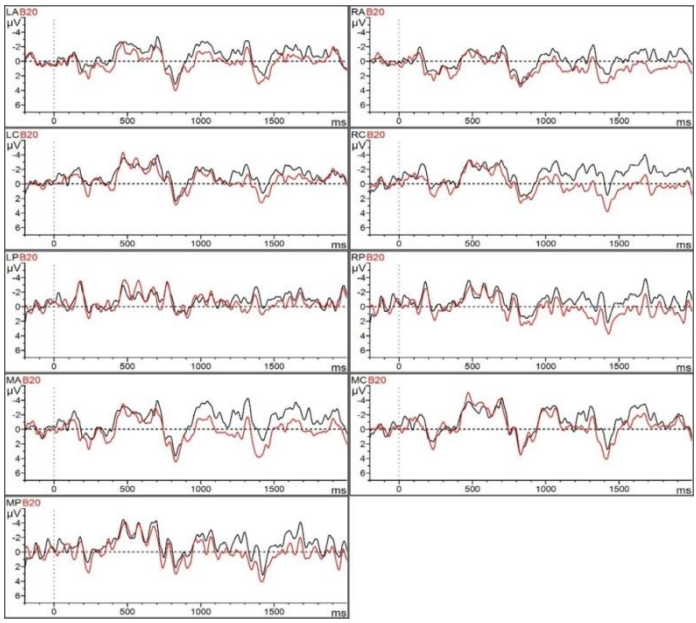

Figure 6. Grand average ERPs for the first disambiguating word following the auxiliary across 9 ROIs in Experiment 2: black line represents congruent sentences and the red line represents incongruent sentences

4. Discussion

4.1 Results summary

The behavioral responses for time reference processing in BCS indicate an overall high level of accuracy in distinguishing between congruent and incongruent sentences. In general, the participants were very successful in recognizing which sentences contained a temporal violation on the behavioral level. However, there was a slightly greater percentage of accurate responses for the congruent sentences as opposed to the incongruent ones. Furthermore, there was some individual variability in responses to the grammaticality judgment question, which means that some participants were more successful in recognizing the violation than others.

When it comes to the ERP results, we have only found one significant effect in Experiment 1. A late negativity occurred time-locked to the target auxiliary in the 700-1000 ms time window. There was no trace of a P600 effect, even when the search for it continued in later time windows. Experiment 2 showed only marginally significant effects in later time windows as well (700-900 ms, 1000-1200 ms, and 1200-1500 ms). Additional post-hot analyses were done to check whether the observed positivities would yield any significant effects. However, none of the interactions reached the $p < .05$ significance threshold.

4.2 Results in relation to the predictions

The first question that was posited in this study was whether temporal violations would be observed on the neurocognitive level in native speakers of BCS. We have claimed that future time reference violations by a past tense form may not be observed at all, based on the idea that the PAst DIscourse LInking Hypothesis (PADILIH) may be correct in predicting that all grammatical morphology referring to the past is processed at the level of discourse, and/or due to the fact that these languages have more flexibility in the usage of the tense system for narrative purposes. In terms of the PADILIH, the absence of an effect would be comparable to the absence of an effect for the Dutch simple past tense form used in the present context in Dragoy et al. (2012). However, our study looked at violations of the future time frame, and we did find one significant effect in Experiment 1, so the explanation in line with the PADILIH could only be used to describe the pattern of results we got for Experiment 2. If morphology referring to the past involves processing at the discourse level, as claimed by the PADILIH, then the absence of the P600 and the fact that we have not observed any effect

whatsoever could support the idea of distinct levels of processing for past and non-past time reference. Still, this assumption needs to be further investigated. We would need to examine violations of other time frames in BCS, using different verb/tense forms.

Therefore, based on the results that we have obtained from the two experiments, the answer to the first research question cannot be a straightforward one. It is in fact very difficult to judge whether we have observed an effect related to temporal processing. The late negativity in the 700-1000 ms time window has not been reported for any of the previous ERP studies on time reference processing. What has been reported is the so-called sentence-final negativity or SFN. Baggio (2008) found a negativity time-locked to the final word of the sentence (400-700 ms) which had the same polarity and distribution as the typical N400 but was more sustained and had a later maximum. Dragoy et al. (2012) found a negative going wave time-locked to the final word of the sentence. It peaked at 400 ms after stimulus onset and appeared to sustain (a frontal and central effect, more lateralized to the right hemisphere). A sentence final negativity was observed for Mandarin Chinese as well (Qiu & Zhou 2012). The effect occurred between 300-900 ms and it was widely distributed and maximal at medial centro-parietal sites. Still, a sentence-final negativity did not appear in our experiments, making these effects practically incomparable to those we have observed.

However, a similar late negativity was reported for difficulties with lexical (semantic) integration. It was previously found that semantic violations elicit a late centro-parietal negativity (larger over the right hemisphere) that peaks around 750 ms (Friederici, Steinhauer & Frisch 1999). This study investigated lexical integration processes with respect to semantic and syntactic aspects. However, it is important to note that the critical word in this case was also the final word in the sentence, and that the late negativity was observed only after a typical N400 effect time-locked to the same critical word. The authors interpreted it as reflecting secondary semantic processes. Furthermore, the negativity observed in our study was distributed more across the left hemisphere, meaning that these two effects are probably not comparable.

A more tenable explanation is that the observed negativity could be reflecting an increase in memory load. For instance, Otten and Van Berkum (2009) found a late negativity between 900 and 1500 ms which was mostly centrally distributed. Their study examined the effects of working memory capacity on the ability to predict upcoming words in discourse through determiner-noun gender mismatches. They found an early negative deflection for both high and low

working memory capacity readers, but the late negativity only occurred for the latter group. The authors claim that the late negativity could be reflecting some form of additional processing, that is, indicating an increased demand on working memory. Similar negative shifts in relation to a higher working memory load have been reported in the literature before; for instance, in case of more complex syntactic structures (Fiebach, Schlesewsky & Friederici 2001; King & Kutas 1995; Mecklinger, Schriefers, Steinhauer & Friederici 1995). If we take the negativity observed in this study to reflect an increase in memory load, it could mean that the participants used more processing demands in trying to recollect which temporal-lexical adverb occurred before the target auxiliary. In fact, several participants commented on the fact that it was sometimes hard to remember which adverb was presented at the beginning of the sentence, due to a great similarity in sentence structure. Then again, this does not explain the lack of such an effect in Experiment 2, unless the inclusion of subject-verb-complement (SVC) fillers made the participants more alert to the distinction and, consequently, made the choice easier for them.

The second question was related to the linguistic level at which the violation would occur, if indeed observed. This question is also difficult to answer, since the effect reported for Experiment 1 cannot be clearly attributable to either morphosyntactic or semantic/pragmatic processes. The nature of the observed negativity would have to be further addressed, as well as time reference processing in general for this group of native speakers. The fact that we have tested only sixteen participants could have played an important role in the effect that was manifested. Therefore, no general conclusions can be made about the level at which time reference violations might be processed in BCS at this point. The absence of a hypothesized P600 effect was somewhat surprising since this component was reported for all the previous studies that looked into the neural correlates of time reference processing (Baggio 2008; Bos et al. 2013; Dragoy et al. 2012; Qiu & Zhou 2012). However, future time reference violations were only examined by Qiu & Zhou (2012), and Mandarin Chinese is a typologically different language. It might be the case that the BCS time reference violations were not strong enough to elicit robust ERP effects, due to a highly relative usage of the tense system for narrative purposes in this group of languages. Consequently, the last two research questions are practically rendered invalid, since the hypothesized P600 effect did not occur in any of the experiments. It cannot be claimed with certainty that we have observed an ERP effect for time reference violations on the auxiliary in Experiment 1, and the inclusion of SVC fillers in Experiment 2 did not

alter the processing strategy by delaying this effect to the first disambiguating word after the auxiliary. However, the inclusion of SVC fillers seems to have altered the processing strategy to some extent, in that the late negativity seen in Experiment 1 did not occur in Experiment 2.

Lastly, we need to address the fact that a discrepancy occurred between behavioral and ERP data, meaning that the participants were successful in recognizing the violation on the behavioral level, while there was an obvious lack of an ERP effect. The explanation for this occurrence most probably does not lie in potential task and stimuli presentation effects. We used a visual word-by-word presentation, followed by an acceptability judgment question. It is unlikely that the mode of presentation had any impact on the results, since it did not play a role in any of the previous time reference studies. However, this discrepancy also occurred in the Dragoy et al. (2012) study, where the participants were successful in recognizing the violation on the behavioral level but no ERP effect was observed, apart from a sentence-final negativity. Although they were successful in detecting the violation behaviorally, the participants in their study were slower and had less correct responses for violations by a past verb in comparison to the present verb. Dragoy et al. (2013) concluded that past time reference processing requires more complex processing or extra attention. Therefore, we could draw a parallel between their findings and the results we have obtained. However, this assumption would require further testing and the examination of reaction time data. It might also be the case that consciously detected violations might differ from non-consciously detected violations, that is, time-reference violations in BCS might not be processed as fully ungrammatical when measured online, despite people judging them as ungrammatical in an offline judgement task. Such discrepancy between online and offline results might reflect the participants' prescriptivist education rather than their genuine language processing.

4.3 Issues for future research

Since this study did not directly replicate any of the results previously reported on time reference processing and ERPs, we need to consider whether this kind of outcome can be attributed to the research design, the type of languages under investigation, or the complexity of time reference processing in general. The experimental paradigm was carefully designed, and all different versions of the experiment were adapted by native speakers of each language. Therefore, it is unlikely that the experimental design was faulty in terms of structural and lexical

properties of the stimuli. However, it is possible that the violations we created were not robust enough to detect a strong time reference effect on the neurocognitive level; a narrative reading and interpretation of the stimuli might have confounded this effect. On the other hand, it is important to note that these are the only type of violations we could have used for future time reference in BCS. Violations by another past tense form would not have been possible due to the fact that other past tenses are either obsolete or can generally be used for reference to the future.

What could have played a major role in observing such results is the number of participants we have included in the study. It is possible that the number was insufficient to yield stronger ERP effects. Furthermore, we have collapsed all the data from the three languages under investigation. We did not expect the effect to differ across languages since they can be seen as language variants rather than completely separate languages. However, this presupposition may not have been completely valid. Therefore, future research would need to address this issue. The inclusion of more participants and examination of only one language could possibly yield stronger effects. Consequently, such restrictions would offer more insight into time reference processing in general. Furthermore, we still need more ERP studies that investigate typical language processing and time reference. The research on this topic has not been abundant enough to make general conclusions about how time reference is processed on the neurophysiological level. Moreover, this type of research would enable further testing of the PAst DIscourse LInking Hypothesis (PADILIH) and could tell us more about the underlying issues linked to time reference in agrammatism.

References

Abuom, T. & Bastiaanse, R. (2013). Production and comprehension of reference of time in Swahili–English bilingual agrammatic speakers. *Aphasiology*, *27*(2), 157-177.

Alexander, R. (2006). *Bosnian, Croatian, Serbian, a Grammar: With Sociolinguistic Commentary*. Madison, Wis.: University of Wisconsin Press.

Arbib, M. (2003). *Handbook of Brain Theory and Neural Networks* (2nd ed.).Cambridge, Mass: The MIT Press.

Avrutin, S. (2006). Weak Syntax. In K. Amunts & Y. Grodzinsky, *Broca's region* (pp. 49-62). New York: Oxford Press.

Baggio, G. (2008). Processing Temporal Constraints: An ERP Study. *Language Learning*, *58*, 35-55.

Barić, E., Lončarić, M., Malić, D., Pavešić, S., Peti, M., Zečević, V. & Znika, M. (2005). *Hrvatska gramatika*. Zagreb: Školska knjiga.

Bastiaanse, R., Bamyaci, E., Hsu, C., Lee, J., Duman, T. & Thompson, C. (2011). Time reference in agrammatic aphasia: A cross-linguistic study. *Journal of Neurolinguistics, 24*(6), 652-673.

Bos, L. & Bastiaanse, R. (2014). Time reference decoupled from tense in agrammatic and fluent aphasia. *Aphasiology*, *28*(5), 533-553.

Bos, L., Dragoy, O., Stowe, L. & Bastiaanse, R. (2013). Time reference teased apart from tense: Thinking beyond the present. *Journal Of Neurolinguistics, 26*(2), 283-297.

Burkhardt, P. (2007). Reference assignment in the absence of sufficient semantic content. In M. Schwarz-Friesel, M. Consten & M. Knees (Eds.), *Anaphors in text: Cognitive, formal and applied approaches to anaphoric reference* (pp. 241-258). Amsterdam / Philadelphia: John Benjamins Publishing Company.

Comrie, B. (2001). *Aspect*. Cambridge: Cambridge University Press.

Comrie, B. (1985). *Tense*. Cambridge: Cambridge University Press.

Dragoy, O. & Bastiaanse, R. (2013). Aspects of time: Time reference and aspect production in Russian aphasic speakers. *Journal of Neurolinguistics, 26*(1), 113-128.

Dragoy, O., Stowe, L., Bos, L. & Bastiaanse, R. (2012). From time to time: Processing time reference violations in Dutch. *Journal of Memory and Language, 66*(1), 307-325.

Faroqi-Shah, Y. & Friedman, L. (2015). Production of Verb Tense in Agrammatic Aphasia: A Meta-Analysis and Further Data. *Behavioural Neurology*, *2015*, 1-15.

Fiebach, C. J., Schlesewsky, M. & Friederici, A. (2001). Syntactic working memory and the establishment of filler-gap dependencies: insights from ERPs and fMRI. *Psycholinguist, 30*(3), 321-338.

Filip, H. (2012). Lexical Aspect. In R. Binnick (Ed.), *The Oxford handbook of tense and aspect* (pp.721-751). New York: Oxford University Press.

Friederici, A., Steinhauer, K. & Frisch, S. (1999). Lexical integration: Sequential effects of syntactic and semantic information. *Memory & Cognition, 27*(3), 438-453.

Fyndanis, V., Arcara, G., Capasso, R., Christidou, P., De Pellegrin, S. & Gandolfi, M., Panagea, E. & Micelli, G. (2018). Time reference in nonfluent and

fluent aphasia: a cross-linguistic test of the PAst DIscourse LInking Hypothesis. *Clinical Linguistics & Phonetics*, *32*(9), 1-21.

Goodglass, H. & Kaplan, E. (1972). *The assessment of aphasia and related disorders*. Philadelphia: Lea & Febiger.

Greenhouse, S. & Geisser, S. (1959). On methods in the analysis of profile data. *Psychometrika*, *24*(2), 95-112.

Hammer, A., Jansma, B., Lamers, M. & Münte, T. (2008). Interplay of meaning, syntax and working memory during pronoun resolution investigated by ERPs. *Brain Research*, *1230*, 177-191.

Harris, T., Wexler, K. & Holcomb, P. (2000). An ERP Investigation of Binding and Coreference. *Brain And Language*, *75*(3), 313-346.

Jahić, D., Halilović, S. & Palić, I. (2000). *Gramatika bosanskoga jezika*. Zenica: Dom štampe.

Jaszczolt, K. & De Saussure, L. (2013). Introduction: time, temporality, and tense. In K. Jaszczolt & L. De Saussure (Eds.), *Time: Language, Cognition, and Reality* (pp. 1-12). Oxford: Oxford University Press.

Kaan, E. & Swaab, T. (2003). Repair, Revision, and Complexity in Syntactic Analysis: An Electrophysiological Differentiation. *Journal Of Cognitive Neuroscience*, *15*(1), 98-110.

Kent, R. (2004). *MIT Encyclopedia of Communication Disorders*. Cambridge: MIT Press.

King, J. & Kutas, M. (1995). Who Did What and When? Using Word- and Clause-Level ERPs to Monitor Working Memory Usage in Reading. *Journal of Cognitive Neuroscience*, *7*(3), 376-395.

Klajn, I. (2005). *Gramatika srpskog jezika*. Beograd: Zavod za udžbenike i nastavna sredstva.

Klein, W. (2009). How time is encoded. In W. Klein & P. Li (Eds.), *The Expression of Time* (pp. 39-81). Berlin: Mouton de Gruyter.

Kljajevic, V. & Bastiaanse, R. (2011). Time reference in fluent aphasia: Evidence from Serbian. In A. Vatakis, A. Esposito, M. Giagkou, F. Cummins & G. Papadelis (Eds.), *Multidisciplinary aspects of time and time perception*. *COST TD0904 International Workshop* (pp. 258-274), Athens, 2010. Revised selected papers. Lecture Notes in Artificial Intelligence, Volume 6789. Berlin Heidelberg: Springer.

Kutas, M. & Federmeier, K. (2011). Thirty Years and Counting: Finding Meaning in the N400 Component of the Event-Related Brain Potential (ERP). *Annual Review of Psychology*, *62*(1), 621-647.

Kutas, M. & Hillyard, S. (1980). Reading senseless sentences: brain potentials reflect semantic incongruity. *Science, 207*(4427), 203-205.

Li, P. & Shirai, Y. (2000). *The acquisition of lexical and grammatical aspect*. Berlin: Mouton de Gruyter.

Madden, C. & Ferretti, T. (2009). Verb aspect and the mental representation of situations. In W. Klein & P. Li (Eds.), *The Expression of Time* (pp. 217-240). Berlin: Mouton de Gruyter.

Mecklinger, A., Schriefers, H., Steinhauer, K. & Friederici, A. (1995). Processing relative clauses varying on syntactic and semantic dimensions: An analysis with event-related potentials. *Memory & Cognition, 23*(4), 477-494.

Neville, H. J., Nicol, J. L., Barss, A., Forster, K. I. & Garrett, M. F. (1991). Syntactically based processing classes: evidence from event-related potentials. *Journal of Cognitive Neuroscience, 3*, 151-165.

Newman, A., Ullman, M., Pancheva, R., Waligura, D. & Neville, H. (2007). An ERP study of regular and irregular English past tense inflection. *Neuroimage, 34*(1), 435-445.

Osterhout, L. & Holcomb, P. (1992). Event-related brain potentials elicited by syntactic anomaly. *Journal of Memory and Language, 31*(6), 785-806.

Osterhout, L. & Mobley, L. (1995). Event-Related Brain Potentials Elicited by Failure to Agree. *Journal Of Memory And Language, 34*(6), 739-773.

Otten, M. & Van Berkum, J. (2009). Does working memory capacity affect the ability to predict upcoming words in discourse? *Brain Research, 1291*, 92-101.

Psychology Software Tools, Inc. (2012). E-Prime (Version 2.0). Shrapsburg, PA.

Qiu, Y. & Zhou, X. (2012). Processing temporal agreement in a tenseless language: An ERP study of Mandarin Chinese. *Brain Research, 1446*, 91-108.

Smith, C. S. (2008). Time with and without tense. In J. Guéron & J. Lacarme (Eds.), *Time and Modality* (pp. 227-249). Berlin: Springer.

Steinhauer, K. & Ullman, M. T. (2002). Consecutive ERP effects of morpho-phonology and morpho-syntax. *Brain and Language, 83*, 62-65.

Stemmer, B. & Connolly, J. F. (2011). The EEG/ERP technologies in linguistic research: An essay on the advantages they offer and a survey of their purveyors. *The Mental Lexicon, 6*(1), 141-170.

Streb, J., Rösler, F. & Hennighausen, E. (1999). Event-Related Responses to Pronoun and Proper Name Anaphors in Parallel and Nonparallel Discourse Structures. *Brain and Language, 70*(2), 273-286.

Sussex, R. & Cubberley, P. (2006). *The Slavic languages*. Cambridge, UK: Cambridge University Press.

Todorović, N. (2015). Tense and aspect (in)compatibility in Serbian matrix and subordinate clauses. *Lingua, 167*, 82-111.

Yarbay Duman, T. & Bastiaanse, R. (2009). Time reference through verb inflection in Turkish agrammatic aphasia. *Brain and Language*, *108*(1), 30-39.

Zagona, K. (2003). Tense and Anaphora: Is there a tense-specific theory of coreference. In A. Barrs (Ed.), *Anaphora: A reference guide* (pp. 140-171). Oxford: Blackwell Publishing.

Part II: Language Acquisition

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TENDENCIES IN EXPRESSING VERBAL ASPECT IN THE GURBET ROMANI: PILOT EXPERIMENTAL STUDY WITH ELEMENTARY-SCHOOL CHILDREN[*]

Abstract: The Romani system of tense-aspect-modality categories consists of three dimensions: aspectual (perfective : non-perfective), temporal (remote : non-remote), and modal (the category "intentionality"). Aspect is expressed as an extension to the verb stem: the perfective aspect is marked with a perfective marker added to the stem in order to express a completed event, whereas the absence of perfectivity provides an ongoing perspective (Matras 2001). This paper reports on a pilot study of verbal aspect in the Gurbet variety of Romani spoken by elementary-school children in eastern Serbia (the village of Minićevo, next to the town of Knjaževac). Participants (7 Romani-Serbian bilingual children aged 7 to 10) were shown short non-verbal cartoons from the serial "Die Sendung mit der Maus". Participants were asked to retell the content of the cartoons and their production was video-recorded and transcribed. The research was conducted in November 2017, and the material is available in the Digital Archive of the Institute for Balkan Studies (Belgrade). The analysis is based on 23 narratives revealing the following tendencies: perfective markers are added to the verb stems to express completed events; ongoing events are typically unmarked for perfectivity; verbs unmarked for perfectivity additionally refer to completed events; Serbian loanverbs, morphologically adapted to Romani, are used to convey the aspect; and perfectivity is additionally achieved by borrowing Serbian prefixes. Although the majority of verbs behave in the expected way in terms of aspect, several

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exceptions are observed, suggesting that the choice of a verb form (perfective vs. non-perfective) might refer to the temporal dimension of an event, to its iterativity, or moreover be used for the narrative purposes.

Key words: verbal aspect, perfectivity, the Gurbet Romani, loanverbs, children's narratives

1. Introduction

The paper presents a pilot experimental study on aspect in the Gurbet variety of Romani spoken in eastern Serbia (in the village of Minićevo, next to the town of Knjaževac). The research is part of a broad project aiming at documenting and analyzing narratives in the Gurbet Romani in elementary-school children and creating a corpus of children's narratives. The project builds on the previous research conducted in 2016 and 2017 within the project "Exploring the Language and Folklore of Roma in Knjaževac", financed by the Ministry of Culture and Information of the Republic of Serbia and carried out by the "Njegoš" National Library in Knjaževac (for more details, see Ćirković & Mirić 2017; Mirić & Ćirković 2018; Sikimić 2018). Conducted as a pilot research, this study provides an overview of the tendencies in expressing verbal aspect in the Gurbet Romani spoken by young Romani-Serbian bilingual speakers in the experimental setting, which can be fruitful for further investigation of the temporal and aspectual system in Romani. Given that this is a pilot study, only a small sample of younger elementary-school population is tested, while the information on aspect in pre-school children and adults as control group will be added in the future research. Therefore, the study is not designed as developmental, and treats elementary-school children's production of aspect as adult-like, using the available data to take a look into the aspectual system in a small sample of speakers.

The paper is organized as follows. In the remainder of the Introduction a brief overview of Romani dialects is presented, followed by information on the Romani aspect and borrowing in the domain of aspectual system. After presenting the short overview of studies on the acquisition of verbal aspect, the aim and hypotheses are formulated. In Section 2, the experimental methodology is described, and details on the participants, materials and the procedure are given. Section 3 deals with the distribution of aspectual forms (perfective vs. non-perfective) with regard to the completion of events the verbs refer to (completed vs. ongoing). This section focuses on the tendencies in expressing verbal aspect in the Gurbet variety. In Section 4, the main tendencies are summarized and discussed in relation to the results of previous studies, and ideas for methodological

improvement and further research are presented. Section 5 presents the concluding remarks.

1.1 *The Romani language*

Romani is an Indo-European language which is nowadays spoken in Europe, North and South America, and Australia by at least 3.5 million speakers. There are at least 4 large branches of Romani dialects: North (Northwestern and Northeastern), Central, Vlax, and Balkan branch, all of which can be further divided into subgroups of dialects and varieties (Bakker and Matras 1997: xvii–xx; Matras 2004: 12; Matras 2005). The Vlax branch is considered the most prominent group of Romani dialects in terms of numbers of speakers and geographical distribution (Matras 2004: 7). The Gurbet variety that we are dealing with in the study belongs to the Southern Vlax subgroup (Matras 2004).[1] Gurbet Romani is mostly spoken in the southwest of the Balkans, i.e. in parts of Serbia, Montenegro, Bosnia and Herzegovina, North Macedonia, Bulgaria and Albania (Bakker and Matras 1997: xxv; Matras 2004: 8; ROMLEX).

Various Romani varieties are spoken throughout Serbia, where Romani was recognized as a minority language in 2006, when the Republic of Serbia ratified the European Charter for Regional or Minority Languages.[2] In eastern Serbia, in the town of Knjaževac and the surroundings, where the data for the study were collected, the 2011 Census registered 673 Romani speakers (2.14%).[3] In this area, the dominant varieties are Leyash and Gurbet, which belong to the Northern and Southern Vlax subgroups, respectively (Sikimić 2018), although the exact number of speakers across varieties is unknown. Gurbet Romani speakers in eastern Serbia, both adults and children, are typically bilingual in Romani and the local Serbian variety.[4] The use of Romani is restricted to the family environment and the local Roma community (Mirić 2019).

[1] For a linguistic description of the Vlax varieties see Boretzky (2003), Hancock (1995), Leggio (2011), among others.

[2] At its session held on 21st December 2005 the National Assembly of Serbia and Montenegro adopted the Law on Ratification of the European Charter for Regional or Minority Languages (Official Gazette of SCG – International Treaties, No. 18/2005). The Charter came into force for the Republic of Serbia as successor to the State Union of Serbia and Montenegro on 1st June 2006.

[3] According to the 2011 Census, 1.4% of inhabitants declared themselves as Romani speakers at the state level.

[4] The same holds for other Balkan states, where Roma people are likely to know both minority and majority languages (Friedman 2001: 149).

1.2 *Aspect in Romani*

Most linguistic theories distinguish between the grammatical and lexical verbal category of aspect. The grammatical aspect typically refers to perfective vs. imperfective opposition (Comrie 1976); it is often explicitly marked by linguistic means such as inflectional or derivational morphology, and shows wide cross-linguistic variation. The lexical aspect (also referred to as aktionsart, type of verbal situation, or inner aspect) refers to inherent semantic properties of verbs. One of these properties is telicity which indicates whether an event that a verb refers to has an inherent boundary or endpoint. Events are telic if they involve a boundary, whereas atelic predicates refer to events without a boundary (Arsenijević 2006).[5] Telicity is not explicitly marked in languages. To the best of our knowledge, Romani has not been discussed from these perspectives. Therefore, in this paper we will adopt the terminology on tense and aspect categories developed in the Romani linguistics literature and use notions such as *perfective* vs. *non-perfective*, as well as *completed* vs. *ongoing events* (cf. Matras 2001, 2004).

Typologically, "Romani is a language with prevailing agglutination, complemented to a high degree by inflectivity, to a lesser but still significant degree by analyticity" (Elšik 1997: 26). Romani verbs are composed of a lexical root which can be followed by suffixes marking various categories, such as loan adaptation, valency, perfectivity, person and number inflection, remoteness and modality; particles and auxiliaries are used to express future tense, stative present, remote or perfect tense and conditional and quotative modality (Matras 2004: 117-118). As an illustration of various suffixes and particles added to a verb root, several examples from the Gurbet variety of Romani spoken by adult speakers in Knjaževac and the surroundings are provided in (1).[6] The examples are taken from Ćirković & Mirić (2017), the glosses and translation are ours.

(1) a. *so* *džan-av* *ka* *moth-av* *tuće*
what know.1SG FUT tell.1SG you
'I will tell you what I know.'

[5] According to Vendler's classification, telic predicates include accomplishments and achievements, while atelic predicates include states and activities (Vendler 1957, 1967).

[6] Abbreviations used in the paper: SG – singular, PL – plural, PF – perfective aspect, NON-PF – the absence of perfectivity, IMPF – imperfective aspect, M – masculine, F – feminine, DAT – dative, POSS – possessive, LOAN – loanword markers, SLASP – Slavic aspect, Sr – Serbian loanwords (morphologically adapted or not), CAUS – causative, FUT – future particle, IMP – imperative, COND – conditional, REM – remote, COMP – complementizer, REFL – reflexive, TAM – tense-aspect-modality, lit. – literally.

b. *beš-l-em* *ande* *Nemačka*
live.PF.1SG in Germany.Sr
'I lived in Germany.'

c. *posle* *žen-isa-lj-em*
afterwards.Sr marry.LOAN.PF.1SG
'I got married afterwards.'

d. *drab-ar-en*
cure.CAUS.3PL
'They are foretelling.'

e. *katastrofa* *bi* *av-el-a*
disaster.Sr COND.Sr come.3SG.REM
'It would be a disaster.'

f. *sov,* *me* *za-su-t-em* *gja*
sleep.IMP.2SG I SLASP.sleep.PF.1SG like that
'Sleep, I fell asleep like that.'

The Romani system of tense-aspect-modality categories consists of three dimensions: aspectual (perfective : non-perfective), temporal (remote : non-remote), and modal (the category "intentionality") (Matras 2001: 164). Aspect is expressed as an extension to the verb stem: the perfective aspect is marked with a perfective marker added to the stem in order to express a completed action or event, as in the examples (1b), (1c) and (1f).[7] In the literature, this form is usually referred to as past, preterite or aorist. As pointed out by Matras, the event encoded by the Romani perfective is viewed as one that has been completed prior to or at the contextual point of reference that is provided. As the reference time remains unspecified in relation to the moment of speaking, the Romani perfective lacks the deictic anchoring function that characterizes tenses (Matras 2001: 165).

The absence of perfectivity provides an ongoing perspective (characteristic of present, as in the examples (1a) and (1d), and imperfect), and 'imperfectivity' can be regarded as the absence of 'perfectivity' (Matras 2001: 165). The preterite (and the pluperfect) encode the perfective aspect, whereas "all the other TAM values are *non-perfective* by default." (Matras & Elšík 2006: 188).

[7] Perfective markers in Romani dialects are *-d-*/*-d'-*/*-dž-*, *-l-*/*-l'-*/*-j-*, *-t-*, *-in-*, and *-il-* (Matras 2001: 168). For the markers in Vlax dialects see Boretzky (2003: 60–62). For the Early Romani perfective inflection classes see also Matras and Elšík (2006: 80–81).

As exemplified in (2), the same verb lemma can be interpreted as either perfective or non-perfective, depending on whether it is used with or without the perfective marker. In non-perfective forms there are no specific aspectual markers.

(2) a. *Vov* *ćer-el* *e* *torta*.
he make.3SG the cake.Sr
'He is making the cake.'

b. *Vov* *ćer-d-a* *e* *torta*.
he make.PF.3SG the cake.Sr
'He made the cake.'

Tense in the deictic sense is expressed by agglutinative remoteness marker (as in (1e)) (Leggio 2011; Matras 2001; Matras 2004; Matras & Elšík 2006). According to Matras, remoteness is a temporal category, aspectually neutral since it does not refer to the internal structure of the event and places an event relative to the immediate context of speech (Matras 2001: 166; Matras 2004: 153). Regarding modality, tense-aspect categories are used as non-indicative within the scope of the non-factual complementizer *te*: the only inherently non-indicative form is the subjunctive, with the meaning of intentionality (Matras 2001: 167).

1.3 *Aspect and borrowing in Romani*

Previous research has shown that Romani varieties are highly susceptible to loanwords, given that the majority of Romani speakers are bilingual or multilingual and enter various types of language contact situations:

> "The sociolinguistic situation of all Romani varieties is highly favourable to contact-induced developments, since almost all Romani speakers are bilingual in the relatively prestigious languages of the dominant "matrix" populations and since, at the same time, Romani linguistic ideologies are relatively tolerant of borrowing in most functional domains." (Elšík 2007: 276).

According to Friedman (2001: 153), the Romani tense-aspect system, together with substantival and pronominal categories, is more resistant to contact-induced change in comparison to the adjectival system and modal categories of verbs. Nevertheless, in the domain of aspectual system several studies report on contact-induced changes and borrowing, mostly in aktionsart marking (cf.

Bodnárová & Wiedner 2015; Elšík 2007; Friedman 2001; Kiefer 2010; Matras 2001).

The emergence of aktionsart marking in Romani is triggered by contact developments, either through incorporating the verbal prefixes and/or particles or through borrowing the entire verb derivation system, as it is explained in the following paragraphs. Given that the data on borrowing in the domain of aspect are insufficient for the Gurbet variety, the aspect marking will be explained in relation to other Romani varieties, as they provide a valuable insight into the overall aspectual system.

Incorporating the verbal prefixes and particles to mark the aktionsart is characteristic of the Romani dialects in contact with German and Hungarian. Following Igla (1992), Matras lists several possible outcomes of borrowing from German to the Sinte Romani: the entire verbs may be replicated, the particle may be replicated with inherited verbs, a replicated verb may be accompanied by a calqued particle or the entire verb may be calqued (Matras 2001: 175-176). Bodnárová and Wiedner (2015) provided a detailed analysis of the development of verbal particles in Vend Romani varieties in contact with Hungarian and German. They showed that verbal particles in these Romani varieties developed through grammaticalization, direct borrowing, loan translation and the change of contact languages, and that they are used to derive new verbs or assign certain aktionsart to verbs. Elšík reported on the novel functions of the Greek-origin suffix *-(V)s-* in Rumungro, which might serve as a stem extension in aktionsart derivations as a part of the suffix *-(i)sal-* (Elšík 2007: 281). Kiefer (2010) analyzed the aktionsart-formation in several languages, one of them being the Lovari Romani. In this Romani dialect the old tense system reduced to past and not-past opposition and simultaneously developed a series of devices to mark the aktionsart: it developed particles due to the contact with Hungarian (from the Hungarian adverbs), it borrowed Slavic prefixes under the influence of Russian, and it either borrowed nontransparent German particles or developed its own in contact with German (Kiefer 2010: 158-160).

Furthermore, dialects in contact with the Slavic languages borrow verbal prefixes that can carry lexico-aspectual meaning. Friedman (2001: 152) reports on the borrowing of the Macedonian prefix *po-* in the Macedonian Arli variety, e.g. *kinel* 'buy' vs. *pokinel* 'pay for'. According to him, the distinction between *kinel* and *pokinel* is a lexical adaptation of the Slavic imperfective/perfective grammatical distinction, and in Romani this opposition is not part of the grammar. In his analysis of verbal aspect in Romani varieties in contact with Bulgarian, Igla

(1998: 68-69) pointed out that Bulgarian prefixes might be attached to Romani verbs without any aspectual differentiation or lexical change of the verbs (e.g. *bistrav* 'forget' vs. *zabistrav* 'forget'), while in other cases the prefix borrowing leads to the semantic modification of a verb (e.g. Romani *sovav*$_{1SG}$ – Bulgarian *spja*$_{IMPF}$ 'sleep', Romani *<u>za</u>sovav*$_{1SG}$ – Bulgarian *zaspja*$_{PF}$/*zaspivam*$_{IMPF}$ 'fall asleep', Romani *<u>na</u>sovav*$_{1SG}$ *man* – Bulgarian *naspja se*$_{PF}$/*naspivam se* $_{IMPF}$ 'have a good sleep'.

The other type of aktionsart marking is the verb derivation system of Slavic languages. According to Matras, Slavic aspect is borrowed in some Romani dialects in contact with Slavic languages, but it is not characteristic of the dialects spoken in the Balkans. Slavic aspect in Romani appears to be borrowed as a fixed derivation set, which is applied to those Romani verb roots that parallel verbs which allow the modification in a contact language, such as *dava* 'I give', *dodava* 'I add', *obdava* 'I embrace' etc., in the Northern Russian Romani variety Xaladitka (Matras 2001: 175-176).

1.4 *The acquisition of verbal aspect*

Previous empirical studies on the acquisition of aspect mainly focused on the data from pre-school children, showing cross-linguistically that children at the age of 5 (in some studies, even at the age of 3) behave adult-like in the domain of perfective and imperfective aspect comprehension, as they tend to relate imperfective telic predicates to completed and incomplete events, and perfective telic predicates only to completed events (García del Real, van Hout & Ezeizabarrena 2014; Kazanina & Phillips 2007; Vinnitskaya & Wexler 2001; Weist et al. 1984, among others). However, at the production level, children and adults differ. Unlike adults who use perfective aspect for completed events, and imperfective exclusively for incomplete ones, children use imperfective aspect to describe both completed and incomplete events (García del Real, van Hout & Ezeizabarrena 2014; Vinnitskaya & Wexler 2001).

In relation to tense, previous research has shown that at an early age past and perfective morphology is typically attached to telic predicates, whereas present and imperfective morphology attaches to atelic predicates, which triggered the *Aspect before Tense Hypothesis* (Antinucci & Miller 1976; Bronckart & Sinclair 1973; Shirai & Andersen 1995; Weist et al. 1984). The data supporting this view mostly come from Germanic and Romance languages. However, the research on the aspect acquisition in Slavic languages showed that tense and aspect are

acquired independently and that children are able to correctly produce perfective and imperfective verbs even at an early age (Gagarina 2004; Stoll 2001; Vinnitskaya & Wexler 2001; Weist et al. 1984). The overall results suggest the cross-linguistic variation in the acquisition of aspect.

Some researchers pointed out that the acquisition of aspectual systems continues even after the age of 5, as children's production at that age differs from the adults' one in the proportion of perfective verbs and the usage of aspectual pairs in Slavic languages (Gagarina 2004; Savić, Popović & Anđelković 2017). However, taking into account previous empirical findings in the domain of aspect acquisition, we assume that elementary-school children from the age of 7 behave adult-like in the aspect production.

1.5 *Aims and hypothesis*

Having in mind the overall TAM system in Romani, the aim of this pilot study is to explore the tendencies in expressing the verbal aspect in the Gurbet Romani variety in bilingual elementary-school children. Following previous findings on the aspect acquisition which showed that perfective verbs typically refer to completed events, while imperfective refer to incomplete ones, and taking into account the aspectual system in Romani, we assume that verbs with perfective markers will refer to completed events, while the absence of perfectivity will signify ongoing events.

Departing from the previous reports on borrowing at different levels of linguistic structure that characterize Romani varieties, as well as from the fact that Romani speakers in Serbia are bilingual and their language susceptible to loanwords (Ćirković & Mirić 2018), we hypothesize the influence of Serbian in the domain of expressing aspect.[8]

Serbian verbs are traditionally divided in perfective and imperfective. According to Arsenijević (2006: 202): "the stem verb is normally imperfective [...]. Adding a prefix to a stem verb contributes a lexical meaning (often even causing a shift in the lexical meaning of a verb), and it makes the verb perfective. [...] Adding a suffix to a perfective verb (even to a perfective stem verb) makes the verb imperfective." For instance, the perfective verbs *zapevati*$_{PF}$ 'start singing' and

[8] The larger sample of narratives gathered within the project contains significant examples of code-switching. However, the narratives collected in the experiments investigating aspect were told in Gurbet Romani, without code-switching to Serbian. Therefore, only the Serbian loanverbs are included in the study.

otpevati$_{PF}$ ‘finish singing’ are formed by adding the prefixes *za-* and *od-*, respectively, to the imperfective verb *pevati*$_{IMPF}$ ‘sing’; the imperfective verb *prepisivati*$_{IMPF}$ ‘rewrite’ is formed by adding the suffix *-iv-* to the perfective verb *prepisati*$_{PF}$ ‘rewrite’, which is built by adding a prefix *pre-* to the imperfective verb *pisati*$_{IMPF}$ ‘write’.

The aim of the study is to explore how and to what extent language contact between Serbian and Romani affects the Gurbet Romani verbs in the domain of verbal aspect. One possible contact-induced outcome is that only the prefixes are borrowed in order to mark the aspect and/or aktionsart or that Serbian verbs are borrowed as a whole, already incorporating the information on aspect.

The study is not designed as developmental, but rather uses the available data from elementary-school children to take a look into the aspectual system in Gurbet Romani speakers, assuming that their production is adult-like. Given that this is a pilot study, only a small sample of younger elementary-school population is tested, while the information on aspect in pre-school children and adults as control group will be added in the future research in order to provide the developmental perspective.

2. Methodology

2.1 *Participants*

The sample for the pilot study consists of 7 Romani-speaking elementary-school children aged 7 to 10, all of them bilingual in the Gurbet variety of Romani and the local variety of Serbian. Participants’ first language (L1) is the Gurbet variety of Romani, which they started acquiring from birth in their family environment (all of the participants’ families actively use Romani at home). Given that Romani is a minority language, participants started acquiring Serbian as a second language (L2) in their broader community also at a very young age. Regarding the language usage, participants use Romani at home and in their local Romani community, but with Serbian-speaking peers they speak Serbian and they attend school classes in Serbian (for more details, see Mirić 2019).

All participants were students of the elementary school “Dubrava” in the village of Minićevo (next to the town of Knjaževac in eastern Serbia). In the school year 2017/2018, when the research was conducted (November 2017), app. 50% of the students were Romani speakers. The study was approved by the school institution management. Participants’ parents signed the consent form in which they were informed about the content, procedure and aims of the study, and the

participation in the study was voluntary. The experimental procedure required watching visual content, and none of the participants reported any visual problems or impairment.

2.2 *Materials*

In order to elicit the verbs, short non-verbal cartoons from the serial "Die Sendung mit der Maus" (Show about the mouse) were used in the experiment.[9] The cartoons were chosen because they had been previously used in the study of verbal aspect in Serbian conducted with monolingual Serbian-speaking preschool-aged children and adults, and their content was shown to be highly appropriate for studying verbal aspect (Savić, Popović & Anđelković 2017). In each cartoon, two or three characters (a mouse, an elephant and occasionally a bird) were involved in a sequence of actions. Although the full series contains more cartoons, in the pilot experiment participants were shown a selection of only 5 cartoons, whose duration varied between 42 and 84 seconds. A description of their content is provided in the Appendix 1.

2.3 *Procedure*

The experiment was conducted in a separate, quiet classroom. Participants were shown cartoons on a lap-top in the presence of another blind-folded student.[10] After watching a cartoon, each participant was asked to retell its content to the other student. The main reason for such a procedure was to provide the most natural setting in which children would retell the cartoons to their peers who were not familiar with their content. Each child narrated a cartoon as a first responder and always watched a novel cartoon s/he had not seen or heard before, as it was important to avoid bias from other children. Given that this was a pilot study, no training procedure was provided. The short instructions for the task were given in Serbian[11] and children were asked to retell the cartoons in Romani.

2.4 *Transcription*

[9] The cartoons are available on the website: http://www.wdrmaus.de/. The authors are: Dieter Saldecki, Gert Kaspar Müntefering, Armin Maiwald; production WDR, RBB, SR, SWR.

[10] Sometimes a teacher and/or a few classmates were present. They did not interfere during the task.

[11] The instructions were given in Serbian since the experimenter was not fluent in Romani, and all participants understand Serbian.

The production was video-recorded and the transcription was performed by an adult native speaker of the Gurbet Romani.[12] The recordings and transcripts are preserved in the Digital Archive of the Institute for Balkan Studies of Serbian Academy of Sciences and Arts (Belgrade, Serbia).

The transcripts contain the following symbols: G – girl, B – boy (followed by a participant's number and a number of the narrative for each participant), # – short break, ### – long break, ə – hesitation, / – interrupted word followed by self-correction, // – interrupted sentence, […] – missing text (an interruption irrelevant for the narrative), XXX – unintelligible word(s), word [2x] – the number of times a word has been repeated.[13]

For the purpose of this paper, a total of 23 narratives in the Gurbet Romani were analyzed, whose length varied between 19 and 80 word tokens.[14] The examples of the shortest and the longest narrative, with the translation, are provided in (3) and (4).

(3) Dikhlem jekh životinja i slono sar ćhelen fudbal. I ovaj/ i koja aver životinja di/ dija e slone go. (G5_1)

'I saw an animal and (an) elephant playing football. And this/ and this other animal scored the goal.' (lit. 'gave (the) goal to the elephant')

[12] The transcription is based on the commonly adopted orthography in Romani linguistics.

[13] It is noteworthy that Romani aspirated voiceless affricate /čh/ and stops /kh/, /ph/, /th/ were occasionally pronounced as non-aspirated counterparts /č/, /k/, /p/, /t/ in individual lexical items. This tendency towards the loss of aspiration was previously reported in other Romani dialects (Friedman 2001: 149; Matras 2004: 49). Aspirates are also marked as inconsistent in the adult speakers of the Gurbet variety under Serbian (Ćirković & Mirić 2017: 12) or Italian influence (Leggio 2011: 61), or as variants in a given morpheme (Boretzky & Igla 1994). In addition, some of the Gurbet informants tend to pronounce Romani long alveolar trill /rr/ as the alveolar trill /r/ in individual lexical items. The use of this consonant has been reported as unstable, subject to substitution or limited to certain word positions (Friedman 2001: 149-150; Leggio 2011: 61; Ćirković & Mirić 2017: 12). If the transcriber (a native speaker) was not certain about the actual pronunciation of a sound (aspirates and trills), the word transcription has been 'normalized' based on the data from the literature. This was done due to the fact that phonetic and phonological issues are irrelevant for this paper and recordings were not made under experimental conditions required for phonetic and phonological analyses.

[14] Hesitations, unintelligible words, and paralinguistic elements marked in the transcript (e.g. laughing) were excluded from the count, although they remain in the transcript.

(4) Sasa o šimjako thaj o slono. Sasa go igračke, gola krugo, kvadrat thaj kocka. I von thode gova sa go ćher. I [2x] goja čiriklji perada[15] lendje gova. I [2x] von opet ćerde i opet perada lendje. I von opet ćerde i [2x] čiriklji thoda pe upre pe [2x] po kaš. I [2x] posle voj/ pelo lako perje sru/ i srušis/ perada lendje opet e [2x] kućica. I von tradije la, našti te traden la i [2x] posle asaje, i kraj. (B1_3)[16]

'There were the mouse and the elephant. There were those toys, that circle, (a) square and (a) cube. And they put that all (on) that house. And that bird knocked that down. And they again made (it) and (the bird) again knocked (it) down. And they again made (it) and the bird landed on the tree. And afterwards she/ her feather(s) fell, and (it) knocked down again the little house. And they were chasing her away, (they) couldn't chase her away and afterwards (they) were laughing, and the end.'

3. Results

The verbs analyzed in the paper were excerpted from the transcripts. This section firstly provides the number of lemmas, types and tokens excerpted from the transcripts (3.1) and the information on the verb forms (3.2). Afterwards we deal with the distribution of verbs with regard to the perfectivity and completion of events (3.3), and most importantly, we analyze the tendencies in expressing verbal aspect (3.4). Additional remarks on the perfective markers are given in 3.5.

3.1 Verbs count

The overall number of lemmas excerpted from the transcripts is 58, the number of verb types is 90, and the number of verb tokens is 213.[17] All verb types excerpted from the transcripts together with relevant details are provided in the Appendix 2.

[15] According to Ćirković and Mirić (2017), in the adult Gurbet speakers from the same area, the preterite of the verb *peravel* 'knock down' is *peravda*.

[16] The word *lendje*, which is used in the example, but not translated, is a 3PL.DAT pronoun with the possessive meaning, lit. 'the bird knocked them$_{POSS}$ down the house', with the meaning: 'the bird knocked their house down'.

[17] Lemma – basic verb form: 3SG (present), given that Romani has not retained the infinitive, e.g. *perel* 'fall'; type – different verb forms per lemma, e.g. *perel* (3SG), *pelo* (3SG.PF.M), *peli* (3SG.PF.F); token – occurrence for each specific type, e.g. *perel* (N=3), *pelo* (N=4), *peli* (N=1).

Figure 1 shows the overall number of lemmas, types, and tokens with regard to the verb origin (Romani verbs vs. Serbian loanverbs).[18]

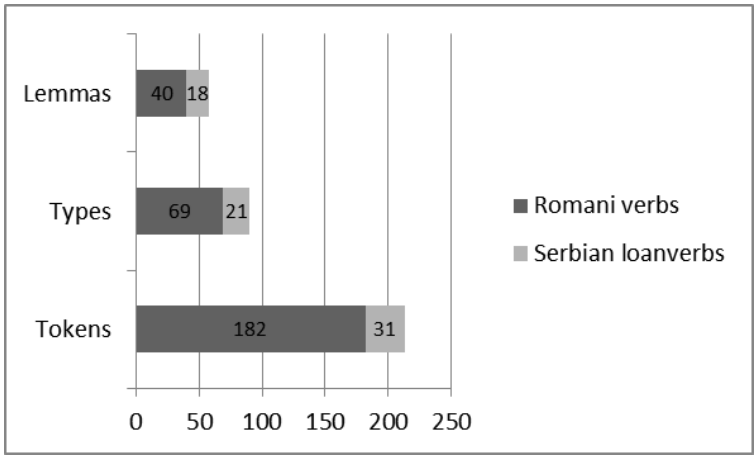

Figure 1. Verbs count

As Figure 1 shows, the majority of the verbs in the sample are Romani. Numerous Serbian loanverbs are hapaxes: 17 out of 31 Serbian loanverb tokens (54.84%) in comparison to 33 out of 182 Romani verb tokens (18.13%) were hapaxes. The Appendix 2 contains the information on the number of children who used each verb type.[19]

[18] We did not count the following cases: a) the nonproductive repetitions, in which a participant repeated exactly the same verb or a phrase twice in a row; b) the interruptions and verbs which were afterwards self-corrected; c) verbs that were not used for the purpose of retelling the cartoons, e.g. digressions or addressing the researcher or a classmate.

[19] Regarding the translation of the verbs in the examples that follow, as well as in the Appendix 2, it should be mentioned that the verb meanings were searched for in several dictionaries, but primarily in Ćirković and Mirić (2017), Boretzky and Igla (1994), and in the ROMLEX lexical database. For those meanings which were not registered in the relevant dictionaries, the translation is provided based on the cartoons content. In particular, the verb *ačhel* 'stand, remain' was sometimes translated as 'land' as it refers to the activity of a bird landing either on a wooden shelf or on a house. The verb *thol* literally means 'put', but it can also be used in the meaning 'place' as in *thoda pe sovel* 'he placed himself / he went to sleep' and also 'land' in the context of a bird landing on a shelf.

3.2 Verb forms

Regarding the person concord, it should be pointed out that the analyzed verbs are inflected for 3SG and 3PL only, as they were the only ones elicited in retelling the actions from cartoons.[20]

Figure 2 shows the distribution of forms of the lexical verbs (N=204, verbs 'have' and 'be' excluded) with regard to the verb origin (Romani verbs vs. Serbian loanverbs).

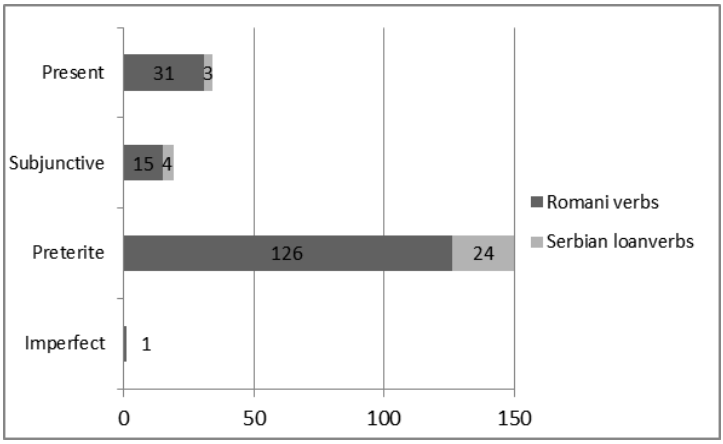

Figure 2. Lexical verb forms

As Figure 2 shows, the vast majority of verbs are used either in the form lacking any overt TAM marking (which corresponds to the present and subjunctive), or in the form with the overt perfective marker (which corresponds to the preterite). Both forms are characterized as non-remote in terms of tense, but differ in aspect – the former being non-perfective and the latter one – perfective. In addition to the non-remote forms, an isolated example of a lexical verb is reported with the remoteness marker *–a* in the form of the imperfect: *sovela*$_{3SG.REM}$ – *sovel* 'sleep', cf. example (5).

[20] The rare examples of other forms (usually 1SG) were excluded from the analysis, as they were not used for retelling the content of the cartoons, but as digressions or for the purpose of starting the narrative, e.g. Dikhlem jekh životinja... '(I) saw an animal...'. In certain cases it was difficult to establish whether they referred to completed or ongoing events.

(5) *vo* *branisarda,* *a* *sovela.*
he defend.LOAN.PF.3SG but.Sr sleep.3SG.REM
'He defended (the goal), although he was sleeping.' (B1_2)

Before presenting the analysis, a point should be made regarding the verbs 'have' (6a) and 'be' (6b), as well as the verbs in the subjunctive form following the non-factual complementizer *te* (examples in (7)), which are all excluded from the analysis.

Romani dialects are conservative in their lack of a lexical verb meaning 'have' (Friedman 2001: 158). This verb bears no special marker for perfectivity. In our sample, it is used only once in the 3SG form (*si le*, N=1) to mark the present tense (cf. (6a)).

Regarding the verb 'be', as pointed out by Leggio (2011: 93) in his analysis of Mitrovica Gurbet Romani, the past-tense copula derives from the present copula by attaching the remoteness marker. Therefore, it cannot bear a marker for perfectivity, and there is no aspectual distinction. This verb always encodes states, as "non-chronological states of affairs in the background", as described in the analysis of the Sinte Romani narratives (Holzinger 1996: 114). The copula 'be' is used in our sample in the 3SG and 3PL forms with the remoteness marker (*sasa*, N=8), in order to set a background of the events (cf. (6b)).

(6) a. *O* *slono* *ćerda* *torta.* *I* *avel*
the elephant.Sr make.PF.3SG cake.Sr and.Sr come.3SG
o *mišo* *i* *novina* *si le.*
the mouse.Sr and.Sr newspapers.Sr have.3SG.M
I *čitol* *novina…*
and.Sr read.LOAN.3SG newspapers.Sr
'The elephant made (a) cake. And the mouse comes and has the newspapers. And he is reading the newspapers…' (G1_1)

(6) b. *Sasa* *o* *šimjako* *thaj* *o* *slono.*
be.REM.3SG the mouse and the elephant.Sr
Sasa *go* *igračke…*
be.REM.3SG those toys.Sr
'There were the mouse and the elephant. There were those toys…' (B1_3)

The verbs used in the complement clauses after the non-factual complementizer *te* are always in the form typically regarded as the subjunctive, marking the 'intentionality' meaning and bearing only inflectional markers (cf. Matras 2001; Matras & Tenser 2016). There were 19 verb tokens of this kind excerpted from the transcripts, both Romani verbs (cf. (7a), (7b) and (7c)) and Serbian loanverbs (cf. (7d)).[21] In either of these cases, the verb is not marked for perfectivity.

(7) a. *O* *mišo* *arakhla* *o* *zvono* *i* *vov*
the mouse.Sr find.PF.3SG the bell.Sr and.Sr he
na/ *naštija* *te* *crdel* *le*.
na/ cannot.PF.3SG COMP pull.3SG it
'The mouse found the bell and he couldn't pull it.' (B1_1)

b. *O* *slono* *xala* *e [2x]* *phabaj* *i*
the elephant.Sr eat.PF.3SG the apple and.Sr
opet *thoda* *pe* *te* *sovel*.
again.Sr place.PF.3SG REFL COMP sleep.3SG
'The elephant ate the apple and again went to sleep.' (B1_2)

c. *I* *posle* *o* *slono* *thaj* *šimjako*
and.Sr afterwards.Sr the elephant.Sr and mouse
lije *te* *asan*.
begin.PF.3PL COMP laugh.3PL
'And afterwards the elephant and the mouse began laughing.' (G4_3)

d. *O* *šimjako* *probisarda* *te [2x]* *zvonil,*
the mouse try.LOAN.PF.3SG COMP ring.LOAN.3SG
al *naštija*.
but.Sr cannot.PF.3SG
'The mouse tried to ring (the bell), but (he) couldn't.' (G4_1)

[21] In the material sampled for this study, the complementizer *te* was used in the complement clauses of the verbs *našti* 'cannot', *mangel* 'want', *probil* 'try', *thol pe* 'place', 'land' (lit. 'put'), *lel* 'begin, undertake' (lit. 'take'), *džal* 'go', *avel* 'come', which were used with or without the perfective marker.

After excluding the verbs meaning ‘have’ and ‘be’ and the verbs in the subjunctive form, the overall number of analyzed verb tokens is 185 (158 Romani verbs, 27 Serbian loanverbs).

3.3 Distribution of verbs according to perfectivity

Figures 3 and 4 depict the distribution of Romani verbs and Serbian loanverbs, respectively, with regard to the perfectivity (non-perfective vs. perfective) and the status of the event/activity (ongoing vs. completed). In Figure 5, the percentages of Romani verbs and Serbian loanverbs are merged since they show similar tendencies in expressing verbal aspect.

In Figures 3–5, non-perfective verbs (non-PF) are the ones without any aspectual markers, while perfective verbs (PF) bear the perfective marker. Whether a verb marks the completed or ongoing event depends on the actual event in a cartoon and a participant’s choice of a verb form. As it will be pointed out later, in some cases, different participants described the same cartoon event by using different verbal aspect, suggesting that participants can approach cartoon events from a different perspective, some of them focusing on the completion (perfectivity), others on the temporal perspective or other dimensions.

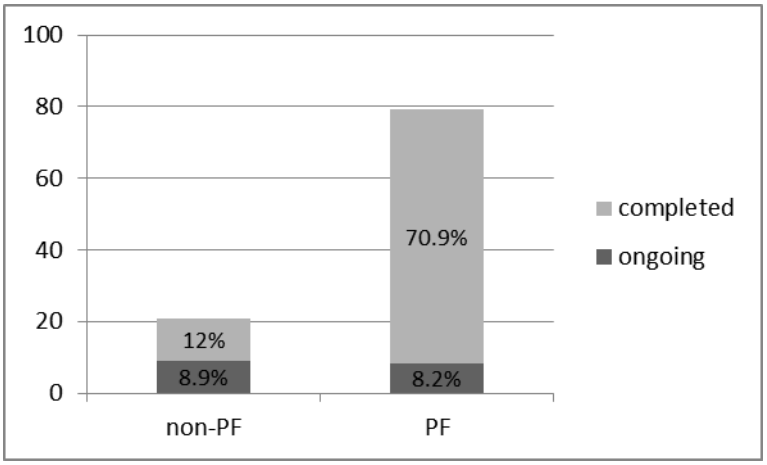

Figure 3. The distribution of Romani verb tokens with and without perfective markers according to the completion of events

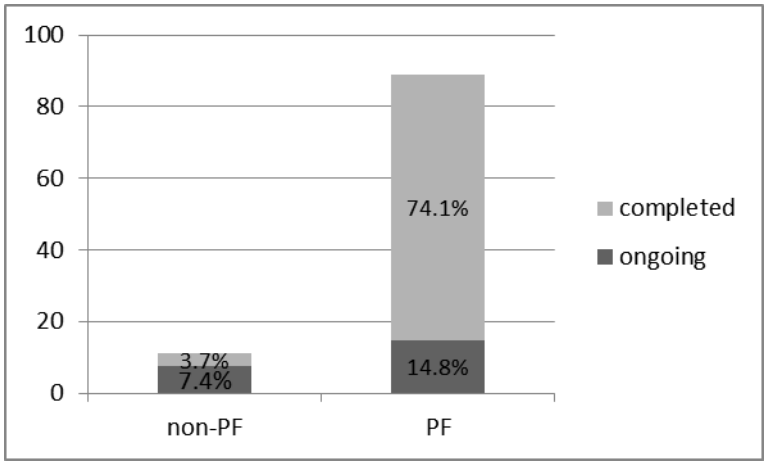

Figure 4. The distribution of Serbian loanverb tokens with and without perfective markers according to the completion of events

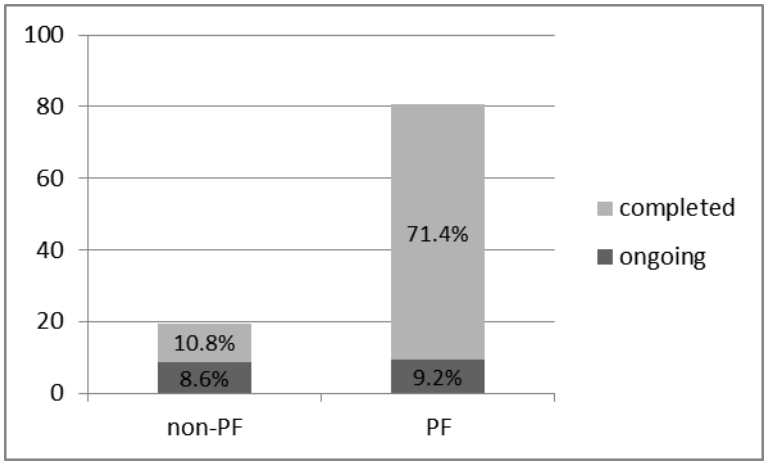

Figure 5. The distribution of verb tokens in the overall sample with and without perfective markers according to the completion of events

As can be seen in Figure 5, the verbs with the perfective marker dominate in the overall sample (cf. N_{PF}=149 (80.6%) vs. $N_{NON\text{-}PF}$=36 (19.4%)). Figures 3 and 4 depict similar distribution in the sample of Romani verbs (cf. N_{PF}=125 (79.1%) vs. $N_{NON\text{-}PF}$=33 (20.9%)) and Serbian loanverbs (cf. N_{PF}=24 (88.9%) vs. $N_{NON\text{-}PF}$=3 (11.1%)). By using the perfective forms, the participants in the study focused on the completion of the series of events. This relates to the fact that not only were the

verbs with perfective marker dominant, but generally verbs referring to the completed events (cf. $N_{completed}$=152 (82.2%) vs. $N_{ongoing}$=33 (17.8%) in Figure 5).

In the overall sample of Romani verbs and Serbian loanverbs bearing a perfective marker (N_{PF}=149), a marker is predominantly used to mark completed events ($N_{PF/completed}$=132 (88.6%)); however, the verbs with a perfective marker were also used to mark ongoing events, although to a much lesser extent ($N_{PF/completed}$ =17 (11.4%)). Remarkably, in the overall sample of Romani verbs and Serbian loanverbs unmarked for perfectivity (N_{NON-PF}=36), the absence of marker marks ongoing events ($N_{NON-PF/ongoing}$=16 (44.4%)), but also the completed ones ($N_{NON-PF/completed}$=20 (55.6%)).

It is worth mentioning that neither individual differences nor any developmental patterns were found in children of different ages regarding the distribution of perfective markers or the reference to completed or ongoing events. The only observed difference was in the size of narratives across ages, showing that younger children (at the age of 7) typically produced shorter narratives than the older ones (at the age of 8, 9, and 10). Given that this finding is irrelevant for this study, it will not be further elaborated.

3.4 Tendencies in expressing verbal aspect

The analysis has revealed several tendencies in expressing verbal aspect in the Gurbet variety of Romani.

3.4.1 Perfective markers in Romani verbs

In the sample of Romani verbs (N=158), a perfective marker is typically attached to the verb stem in order to express perfective (completed) events (N=112 (70.9%)), as in the examples (8) – (11). This tendency prevails in the sample and pertains to the facts that the verbs with perfective markers are the most frequent in our material and that participants mostly referred to completed events.

(8) *O* *slono* *<u>lija</u>* *o* *šlago*
the elephant.Sr take.PF.3SG the whipped cream.Sr
i *<u>thoda</u>* *pe* *torta.*
and.Sr put.PF.3SG on cake.Sr
'The elephant took the whipped cream and put (it) on (the) cake.' (G3_2)

(9) *Avilo* *šimjako* *i* *o* # *o* *slono*
come.PF.3SG.M. mouse and.Sr the # the elephant.Sr
ćerdilo *po*[22] *kao* *po* *sneško beli(ć).*
turn into.PF.3SG.M. into like.Sr into snowman.Sr
'The mouse came and the elephant turned into like a snowman.' (G3_3)

(10) *Pelo* *iv.* *I* *onda* *avilo*
fall.PF.3SG.M. snow and.Sr then.Sr come.PF.3SG.M.
o *šimijako* *i* *ćerda*
the mouse and.Sr make.PF.3SG
jekh *bari* *kugla* *tar* *o* *iv.* (G2_4)
one big ball.Sr from the snow
'(The) snow fell. And then the mouse came and made a big snowball.'

(11) *Posle* *lija* *phabaj,* *čhudija* *lese*
afterwards.Sr take.PF.3SG apple throw.PF.3SG him
i *vov* *istarda* *thaj* *dija* *go.*
and.Sr he catch.PF.3SG and give.PF.3SG goal.Sr
'Afterwards (he_1) took (an) apple, threw him_2 and he_2 caught (it) and (he_1) scored (a) goal.' (B2_2)

However, although the verbs with perfective markers typically refer to completed events, there were several instances of perfective markers added to the stem although the event they referred to was not completed (N=13 (8.2%)), as in the examples (12) – (14):

(12) *I* *von* *tradije* *la,*
and.Sr they chase away.PF.3PL her
našti *te* *traden* *la*
cannot COMP chase away.3PL her
i [2x] *posle* *asaje,* *i* *kraj.*
and.Sr afterwards.Sr laugh.PF.3PL and.Sr the end.Sr
'And they were chasing her away, (they) couldn't chase her away and afterwards (they) were laughing, and the end.' (B1_3)

[22] The preposition *po*/*pe* in the Gurbet Romani consists of a preposition and the definite article *o* or *e* depending on the gender of the noun it precedes. This preposition is typically translated as 'on', although in certain contexts it corresponds to the English prepositions 'in' and 'into'.

(13) *O* *mišo* *arakhla* *o* *zvono* *i* *vov*
the mouse.Sr find.PF.3SG the bell.Sr and.Sr he
na/ *naštija* *te* *crdel* *le*.
na/ cannot.PF.3SG COMP pull.3SG it
'The mouse found the bell and he couldn't pull it.' (B1_1)

(14) *O* *mišo* *avilo* *pašo* *zvono* *thaj* #
the mouse.Sr come.PF.3SG.M near bell.Sr and #
marda *po* *zvono,* *naštisarda,*
hit.PF.3SG on bell.Sr cannot.PF.3SG
gurisarda, *naštisarda,* *vazdija,* *naštisarda*.
push.LOAN.PF.3SG cannot.PF.3SG lift.PF.3SG cannot.PF.3SG
'The mouse approached (a) bell and hit on (the) bell, he couldn't (move it), he pushed, he couldn't, he lifted (it), he couldn't (move it).' (B2_1)

It is noteworthy that in 10 out of 14 examples in this group, the modal verbs *mangla*$_{\text{PF.3SG}}$ – *mangel* 'want', *naštija*$_{\text{PF.3SG}}$ – *našti* 'cannot', and *naštisarda*$_{\text{PF.3SG}}$ – *naštisarel* 'cannot' are the ones marked with the perfective marker. They cannot be analyzed based on the opposition completed vs. ongoing event, as they refer to states. In the example (12), the verb tokens *tradije*$_{\text{PF.3PL}}$ – *tradel* 'chase away' and *asaje*$_{\text{PF.3PL}}$ – *asal* 'laugh' clearly mark the ongoing events.

3.4.2 The absence of perfective markers in Romani verbs

In the sample of Romani verbs (N=158), the forms unmarked for perfectivity are used to mark ongoing events (N=14 (8.9%)), cf. verbs *ćhelen*$_{\text{NON-PF.3PL}}$ 'play' and *phirel*$_{\text{NON-PF.3SG}}$ 'walk', in the examples (15) and (16).

(15) *Dikhlem* *jekh* *životinja* *i* *slono*
see.PF.1SG one animal.Sr and.Sr elephant.Sr
sar *ćhelen* *fudbal*.
how play.3PL football.Sr
'I saw an animal and (an) elephant playing football'. (G5_1)

(16) *O* *šimjako* *phirel [2x],* *i* *o/ [2x]* *e* *kugla*
the mouse walk.3SG and.Sr the/ the ball.Sr
čalavel *e* *šimjako* *ane* *bul* (laughing).
hit.3SG the mouse in bottom
'The mouse is walking, walking, and the snowball hits the mouse in the bottom.' (G3_3)

Nevertheless, certain telic (completed) events were referred to with the non-perfective forms (N=19 (12%)), cf. the verb *čalavel*$_{NON\text{-}PF}$ ‘hit’ in the example (16) above, as well as the underlined verbs in the examples (17) and (18).

(17) *I* *avel* *o* *slono* *i* *dikhel*
and.Sr come.3SG the elephant.Sr and.Sr see.3SG
jekh *avres/* *[…]* *o [2x]* *slono*
one other/ the elephant.Sr
lel *e* *torta* *thaj* *čhudel* *po* *mišo*.
take.3SG the cake.Sr and throw.3SG on mouse.Sr
‘And the elephant comes and he sees one another/ […] the elephant takes the cake and throws it on the mouse.’ (G1_1)

(18) *O* *mišo* *thaj* *o* *slono* *ćerde* *ćher*.
the mouse.Sr and the elephant.Sr make.PF.3PL house
I *posle* *avili* *e* *čiriklji* *i*
and.Sr afterwards.Sr come.PF.3SG.F the bird and.Sr
ačhili *upral* *pe* *go* *vitrina*,
land.PF.3SG.F above on that shelf.Sr
ni *džanav* *so*, *ačhili* *i*
not know.1SG what land.PF.3SG.F and.Sr
posle *von* *ćerde* *kućica*,
afterwards.Sr they make.PF.3PL little house.Sr
voj *ačhel* – *peravel*, *von* *ćeren*,
she land.3SG knock down.3SG they make.3PL
voj *ačhel* – *peravel*. *Posle* *pelo*
she land.3SG knock down.3SG afterwards.Sr fall.PF.3SG.M
katar *e* *čiriklji* *o* *pero* *i* *posle [2x]*
from the bird the feather.Sr and.Sr afterwards.Sr
rušisaljo *o* *ćher...*
knock down.LOAN.PF.3SG the house
‘The mouse and the elephant made (a) house. And afterwards the bird came and landed above on that shelf, I don’t know what, (she) landed and afterwards they made (a) little house, she lands – (she) knocks (it) down, they make (it), she lands – (she) knocks (it) down. Afterwards the bird’s feather fell and afterwards knocked down the house…’ (G4_3)

It seems that the non-perfective form performs a function which is neither temporal nor aspectual. In the example (17) the whole series of events is retold by using the non-perfective forms, although the verbs clearly refer to completed

activities: *avel*$_{NON\text{-}PF}$ ‘come’, *dikhel*$_{NON\text{-}PF}$ ‘see, look’, *lel*$_{NON\text{-}PF}$ ‘take’, *čhudel*$_{NON\text{-}PF}$ ‘throw’. They can be regarded as the narrative present.

Furthermore, as the example (18) indicates, the non-perfective forms may be used in order to emphasize the iterativity of the event, given that the verbs *ćeren*$_{NON\text{-}PF}$ – *ćerel* ‘do, make’, *ačhel*$_{NON\text{-}PF}$ ‘land’, *peravel*$_{NON\text{-}PF}$ ‘knock down’ are used without the perfective marker to mark telic events which happen repeatedly. These verbs were previously introduced in the narrative with the perfective markers (e.g. *ćerde*$_{PF}$, *ačhili*$_{PF}$), signaling the inherent completion of an event.[23]

3.4.3 The same event – different aspect in Romani verbs

In certain cases, different participants opted for different aspectual verb forms for the description of the same cartoon event, as in the examples (19) – (22), where examples in (a) are non-perfective (*perel*, *avel*, *čhudel*, *sovel*), and in (b) – perfective (*pelo*, *avilo*, *čhudija*, *sovda*/*suto*/*zasuto*). Choosing a different aspect is not age-related in the study, since children of different ages opted for either a perfective or non-perfective form.

(19) a. *Perel* *o* *iv ...* *a* *o* *slono*
fall.3SG.the snow and.Sr the elephant.Sr
sasa *gothe* *an’* *go [2x]* *krugo.*
be.REM.3SG there in that circle.Sr
‘The snow is falling… and the elephant was there in that circle.’ (G1_2)

b. *Pelo* *iv.* *I* *onda* *avilo*
fall.PF.3SG.M snow and.Sr then.Sr come.PF.3SG.M
o *šimijako* *i* *ćerda* *jekh* *bari*
the mouse and.Sr make.PF.3SG one big
kugla *tar* *o* *iv.*
ball.Sr from the snow
‘(The) snow fell. And then the mouse came and made a big snowball.’ (G2_4)

(20) a. *O* *slono* *ćerda* *torta.* *I* *avel*
the elephant.Sr make.PF.3SG cake.Sr and.Sr come.3SG
o *mišo* *i* *novina* *si le.*
the mouse.Sr and.Sr newspapers.Sr have.3SG.M

[23] Apart from the alternation of the present and preterite forms within a narrative, narratives describing past events are often characterized by the use of preterite forms at the beginning and the end of a narrative, while the narrative present is used as a stylistic means for expressing vivid and exciting events (Schiffrin 1981; Ćirković 2012).

‘The elephant made (a) cake. And the mouse comes and has the newspapers.’ (G1_1)

b. *Ćerda* *o* *slono* *jekh* *torta* *i* *o*
make.PF.3SG the elephant.Sr one cake.Sr and.Sr the
mišo *avilo*, *čitosarda* *novine…*
mouse.Sr come.PF.3SG.M read.LOAN.PF.3SG newspapers.Sr
‘The elephant made a cake and the mouse came, he was reading the newspapers…’ (G5_3)

(21) a. *o [2x]* *slono* *lel* *e* *torta* *thaj*
the elephant.Sr take.3SG the cake.Sr and
čhudel *po* *mišo.* *O* *mišo* *lel*
throw.3SG on mouse.Sr the mouse.Sr take.3SG
thaj *čhudel* *po* *slono.*
and throw.3SG on elephant.Sr
‘the elephant takes the cake and throws it on the mouse. The mouse takes (it) and throws (it) on (the) elephant.’ (G1_1)

b. *I* *onda* *avilo* *o* *šimjako.* *I*
and.Sr then.Sr come.PF.3SG.M the mouse and.Sr
onda *ə* *lija* *o* *slono* *e* *torta.*
then ə take.PF.3SG the elephant.Sr the cake.Sr
I *onda* *čhudija* *la.* *I* *onda* *xale* *la.*
and.Sr then.Sr throw.PF.3SG it and.Sr then.Sr eat.PF.3PL it
‘And then the mouse came. And then the elephant took the cake. And then (he) threw it. And then (they) ate it.’ (G2_2)

(22) a. *O* *mišo* *avilo* *pašo* *golo.*
the mouse.Sr come.PF.3SG.M near goal.Sr
O *slono* *sovel* *pašo* *go…* (B2_2)
the elephant.Sr sleep.3SG near goal.Sr
‘The mouse approached the goal. The elephant is sleeping near (the) goal.’

b. *O* *slono* *sovda.*
the elephant.Sr sleep.PF.3SG
Avilo *šimjako* *sa* *e* *lopta.*
come.PF.3SG.M mouse with.Sr the ball.Sr
‘The elephant slept. (The) mouse came with the ball.’ (G2_3)

c. *O* *slono* *<u>suta</u>* *po* *go.*
the elephant.Sr sleep.PF.3SG in goal.Sr
I *o* *mišo* *avilo* *i* *vov*
and.Sr the mouse.Sr come.PF.3SG.M and.Sr he
čhudel *e* *lopta.*
kick.3SG the ball.Sr
'The elephant slept in (the) goal. And the mouse came and he kicks the ball.' (B1_2)

d. *O* *slono* *<u>zasuto</u>* *po* *go,*
the elephant SLASP.sleep.PF.3SG in goal.Sr
a *o* *šimjako* *probisarda*
and.Sr the mouse try.LOAN.PF.3SG
te *čhudel* *lese* *o* *go.*
COMP kick.3SG him the goal.Sr
'The elephant fell asleep in (the) goal, and the mouse tried to kick him the goal.' (G4_2)

The examples in (22) are particularly interesting as they reflect the range of options that Gurbet Romani speakers have at their disposal. Namely, the same event is described by 4 different verb types: *sovel*, *sovda*, *suta*, *zasuto*. The last one will be discussed in section 3.4.5., as it combines the Serbian prefix *za-* and the irregular preterite of the Romani verb *suta*. In Gurbet Romani the form *suta* has an irregular stem, whereas the form *sovda* is a regularly inflected form.

As we have already mentioned, the participants might have opted for the non-perfective form as the narrative present, not focusing on the aspectual or temporal perspective, e.g. (19a), (20a), or (21a). We would additionally allow for the possibility that the personal perspective on a particular event affects the choice of a verb form, which depends on whether the speaker focuses on the activity itself, thus choosing a non-perfective form, or on its endpoint, thus choosing a perfective form. For instance, in the cartoon 4 (see Appendix 1 and the example (19) above), the snow is falling at the beginning of the cartoon and continues falling afterwards. This event is clearly ongoing and explains the use of a non-perfective form, as in (19a). However, as some snow had already fallen on the ground, a participant might focus on that fact, marking it with the perfective form, as in (19b).

Although the majority of narratives (15 out of 23) shows variation of the verb forms used with regard to perfectivity (cf. (18)), one narrative contains mostly non-perfective forms (cf. (17)), and others mostly perfective forms (7 out of 23)

(cf. (14)).[24] In addition, regardless of this variation, some verbs are predominantly used in one of the aspectual forms. For instance, the verb *avel* 'come' (N of tokens=24) is used 3 times (12.5%) as non-perfective and 21 times (87.5%) as perfective, which suggests that the verb itself marks the lexical aspect to a certain extent. The Appendix 2 provides information on the number of participants who used a particular aspectual form.

3.4.4 Serbian loanverbs

Numerous loanverbs from Serbian (N of tokens=27) are used in the sample and they are morphologically adapted to Romani. When it comes to the distinction between the perfective and non-perfective forms, as well as the opposition completed vs. ongoing events, several trends have been observed.

Serbian perfective loanverbs are typically used with the adapted perfective markers (*-sard-* or *-salj-*) in order to express completed events (N of tokens=10 (37%)), as in the examples (23) – (26): *okrenisaljo*$_{\text{LOAN.PF.3SG}}$ < Serb. *okrenuti (se)*$_{\text{PF}}$ 'turn around', *krenisarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *krenuti*$_{\text{PF}}$ 'set off', *razmazisarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *razmazati*$_{\text{PF}}$ 'spread'). Apart from the underlined verbs in the examples, the following verbs also belong to this group: *pomerisaljo*$_{\text{LOAN.PF.3SG}}$ < Serb. *pomeriti*$_{\text{PF}}$ 'move', *sapletisaljo*$_{\text{LOAN.PF.3SG}}$ < Serb. *saplesti (se)*$_{\text{PF}}$ 'trip', *pomožisarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *pomoći*$_{PF}$ 'help', *probisarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *probati*$_{\text{PF}}$ 'try'.

On the other hand, Serbian imperfective loanverbs unmarked for perfectivity are used to express ongoing events (N of tokens=2 (7.4%)), as in (27): *čitol*$_{\text{LOAN.NON-PF.3SG}}$ < Serb. *čitati*$_{\text{IMPF}}$ 'read'.

(23) *I* *ondak* *o* *slono* *ə # ə #* *okrenisaljo*
and.Sr then.Sr the elephant.Sr ə # ə # turn around.LOAN.PF.3SG
pe *aver* *strana.*
on other side.Sr
'And then the elephant turned around on the other side.' (G2_1)

(24) *Ćerda* *o* *slono* *jekh* *torta* *i*
make.PF.3SG the elephant.Sr one cake.Sr and.Sr
o *mišo* *avilo,* *čitosarda* *novine*
the mouse.Sr come.PF.3SG.M read.LOAN.PF.3SG newspapers.Sr

[24] When it comes to the participants, only 1 out of 7 participants (G2) used only the perfective forms, whereas other participants used both perfective and non-perfective forms in their narratives.

i *krenisarda* *pe* *torta.*
and.Sr set off.LOAN.PF.3SG towards cake.Sr
'The elephant made a cake and the mouse came, he was reading the newspapers and (he) went towards (the) cake.' (G5_3)

(25) *Sasa* *jekh* *torta.* *I* *onda* *o* *slono*
be.REM.3SG one cake.Sr and.Sr then.Sr the elephant.Sr
lija *šlago.* *I* *razmazisarda*
take.PF.3SG whipped cream.Sr and.Sr spread.LOAN.PF.3SG
umpre.
above
'There was a cake. And then the elephant took (the) whipped cream. And (he) spread (it) above.' (G2_2)

(26) *O* *slono* *sovel* *pašo* *go* *ə* [2x]
the elephant.Sr sleep.3SG near goal.Sr ə
i *vov* *probisarda* *te* *del* *le* *go*
and.Sr he try.LOAN.PF.3SG COMP give.3SG him goal.Sr
'The elephant is sleeping near the goal and he tried to give him the goal.' (B2_2)

(27) *I* *kotar* *šimjako* *avel* *sa* *e*
and.Sr from there mouse come.3SG with.Sr the
novina, *čitol* *e* *novina* *i*
newspapers.Sr read.LOAN.3SG the newspapers.Sr and.Sr
čalada *sa* *e* *novina* *ande* *torta*
hit.PF.3SG with.Sr the newspapers.Sr in cake.Sr
'And from there (the) mouse is coming with the newspapers, he is reading the newspapers and he hit with the newspapers at the cake.' (G3_2).

An isolated example of a Serbian perfective loanverb (N=1 (3.7%)) was found marking the completed event without the perfective marker (*uhvatil*$_{\text{LOAN.3SG}}$ 'catch' < Serb. *uhvatiti*$_{\text{PF}}$ 'catch', with the prefix *u-* marking the endpoint, which contrasts with the Serbian imperfective aspectual pair marking the activity *hvatati*$_{\text{IMPF}}$ 'catch'), as in (28). In this case, it appears that the focus is on iterativity, given that the "elephant always catches the ball".

(28) *vov* *probisarda* *te* *del* *le* *go,*
he try.LOAN.PF.3SG COMP give.3SG him goal.Sr
ali *našti* *pošto* *vov* *uvek*
but.Sr cannot because.Sr he always.Sr

<u>uhvatil</u>.
catch.LOAN.3SG
'… he$_1$ tried to give him$_2$ (the) goal, but (he$_1$) cannot because he$_2$ always catches.' (B2_2)

Remarkably, Serbian imperfective loanverbs marking ongoing events are used with the perfective markers *-sard-* and *-salj-* (N of tokens=4 (14.8%)), as in the examples (29) and (30): *<u>čit</u>osarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *čitati*$_{\text{IMPF}}$ 'read', *<u>nervir</u>isarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *nervirati se*$_{\text{IMPF}}$ 'to be annoyed'. Apart from the underlined verbs, several other verbs belong to this group: *<u>crt</u>osarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *crtati*$_{\text{IMPF}}$ 'draw' and *<u>gadj</u>isarde pe*$_{\text{LOAN.PF.3PL}}$ < Serb. *gađati se*$_{\text{IMPF}}$ 'throw at each other'.

(29) *Ćerda* *o* *slono* *jekh* *torta* *i*
make.PF.3SG the elephant.Sr one cake.Sr and.Sr
o *miso* *avilo,* *<u>čitosarda</u>* *novine*
the mouse.Sr come.PF.3SG.M read.LOAN.PF.3SG newspapers.Sr
i *krenisarda* *pe* *torta*.
and.Sr setoff.LOAN.PF.3SG towardscake.Sr cake.Sr
'The elephant made a cake and the mouse came, he was reading the newspapers and (he) went towards (the) cake.' (G5_3)

(30) *I* *posle* *o* [2x] *slono* *ikljilo*
and.Sr afterwards.Sr the elephant.Sr go out.PF.3SG
thaj *<u>nervirisarda</u>*.
and be annoyed.LOAN.PF.3SG
'And afterwards the elephant went out and (he) was annoyed.' (G5_5)

Completed events are sometimes referred to by Serbian imperfective verbs to which perfective markers *-sard-* and *-salj-* are attached (N of tokens=10 (37%)), as in the examples (31) and (32): *<u>bran</u>isarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *braniti*$_{IMPF}$ 'defend', *<u>ruš</u>isaljo*$_{\text{LOAN.PF.3SG}}$ < Serb. *rušiti*$_{IMPF}$ 'knock down'. In the context of these examples, it would be more semantically precise to use the Serbian perfective verbs *odbraniti*$_{\text{PF}}$ and *srušiti*$_{\text{PF}}$ with the appropriate prefixes (*od-* and *s-*) which mark the endpoint of an event, as these verbs are accomplishments in Serbian, instead of *braniti*$_{\text{IMPF}}$ and *rušiti*$_{\text{IMPF}}$ which refer to activities.[25] Apart from the underlined verbs in the examples, other verbs belong to this group: *<u>šutir</u>isarda*$_{\text{LOAN.PF.3SG}}$ < Serb.

[25] However, even in Serbian, the verb *braniti*$_{\text{IMPF}}$ can be used with the telic meaning in the context of playing football.

šutirati$_{\text{IMPF}}$ 'kick', *gurisarda*$_{\text{LOAN.PF.3SG}}$ < Serb. *gurati*$_{\text{IMPF}}$ 'push', *čudisaljo*$_{\text{LOAN.PF.3SG}}$ < Serb. *čuditi se*$_{\text{IMPF}}$ 'wonder'.

(31) *I [2x]* *dikhla* *kaj* *našti* *te* *del* *go*
and.Sr see.PF.3SG that cannot COMP give.3SG goal.Sr
i *još* *jekhare* *čhudija* *e* *lopta,*
and more.Sr once kick.PF.3SG the ball.Sr
vo *branisarda,* *a* *sovela.*
he defend.LOAN.PF.3SG but.Sr sleep.3SG.REM
'And (he_1) saw that (he_1) cannot score the goal and (he_1) kicked the ball once more, he_2 defended, although (he_2) was sleeping.' (B1_2)

(32) *Posle* *pelo* *katar* *e* *čiriklji*
afterwards.Sr fall.PF.3SG.M from the bird
o *pero* *i* *posle [2x]*
the feather.Sr and.Sr afterwards.Sr
rušisaljo *o* *ćher...*
knock down.LOAN.PF.3SG the house
'Afterwards the bird's feather fell and afterwards knocked down the house…' (G4_3)

As it was the case with Romani verbs, there is a variation across the participants in the use of Serbian loanverbs: while describing the same event, some of the participants used the verb with a perfective marker, others without it, cf. *čitol* in (27) and *čitosarda* in (29). This suggests that a participant's personal perspective on the event plays a role in the choice of aspect. Participants can approach cartoon events from a different perspective, some of them focusing on the completion (perfectivity), others on the temporal perspective or other dimensions.

3.4.5 Borrowing Serbian prefixes

Perfectivity is reinforced by borrowing Serbian prefixes, as in an isolated example illustrated in (33). The Serbian prefix *za-* is added to the Romani perfective form *suto* to obtain the meaning 'fall asleep' analogous to the Serbian verb *zaspati* 'fall asleep$_{\text{PF}}$'. One might interpret this case as the need to mark the aktionsart.[26]

[26] In the verb count, this verb was treated as a Romani verb with a perfective marker referring to a completed event.

(33) *O* *slono* *zasuto* *po* *go,*
the elephant.Sr sleep.PF.3SG in goal.Sr
a *o* *šimjako* *probisarda*
and.Sr the mouse try.LOAN.PF.3SG
te *čhudel* *lese* *o* *go.*
COMP kick.3SG him the goal.Sr
'The elephant fell asleep in (the) goal, and the mouse tried to kick him the goal.' (G4_2)

As has been previously observed, in the domain of adapting verbs to its lexicon, Romani uses borrowed affixes and analytic constructions for purposes of adaptation (Friedman 2001: 152). According to Friedman, this phenomenon is a matter of potential source for a shift to the development of grammaticalized aktionsart (Friedman 2001: 152).

3.5 A remark on the perfective markers

The perfective markers added to the lexical verb roots in our sample are the following:[27]

a) *-d-*, e.g. *astarda*$_{\text{PF.3SG}}$ – *astarel* 'catch', *čalada*$_{\text{PF.3SG}}$ – *čalavel* 'hit, kick', *ćerda*$_{\text{PF.3SG}}$/*ćerde*$_{\text{PF.3PL}}$ – *ćerel* 'do, make', *ćharda*$_{\text{PF.3SG}}$ – *ćharel* 'crush', *ikalda*$_{\text{PF.3SG}}$ – *i(n)kalel* 'take out', *istarda*$_{\text{PF.3SG}}$ – *istarel* 'catch', *marda*$_{\text{PF.3SG}}$ – *marel* 'hit', *naštisarda*$_{\text{PF.3SG}}$ – *naštisarel* 'cannot', *pharrada*$_{\text{PF.3SG}}$ – *pharravel* 'break, tear', *perada*$_{\text{PF.3SG}}$ – *peravel* 'ruin, knock down', *sovda*$_{\text{PF.3SG}}$ – *sovel* 'sleep', *thoda*$_{\text{PF.3SG}}$/ *thode*$_{\text{PF.3PL}}$ *(pe)* – *thol (pe)* 'put' / 'place';

b) *-l-*, e.g. *arakhla*$_{\text{PF.3SG}}$ – *arakhel* 'find', *dikhla*$_{\text{PF.3SG}}$ – *dikhel* 'see, look', *mangla*$_{\text{PF.3SG}}$ – *mangel* 'want', *pharrli*$_{\text{PF.3SG.F}}$ – *pharrol* 'crack, burst', *xala*$_{\text{PF.3SG}}$/*xale*$_{\text{PF.3PL}}$ – *xal* 'eat';

c) *-il-*,[28] e.g. *ačhili*$_{\text{PF.3SG.F}}$ – *ačhel* 'stand', 'land', *asaje*$_{\text{PF.3PL}}$ – *asal* 'laugh', *avilo*$_{\text{PF.3SG.M}}$/*avili*$_{\text{PF.3SG.F}}$ – *avel* 'come', *ćerdilo*$_{\text{PF.3SG.M}}$/*ćerdili*$_{\text{PF.3SG.F}}$ – *ćerdol* 'turn into', *čhudija*$_{\text{PF.3SG}}$/*čhudije*$_{\text{PF.3PL}}$ – *čhudel* 'throw, kick', *ikljilo*$_{\text{PF.3SG}}$ – *i(n)kljel* 'go out', *naštija*$_{\text{PF.3SG}}$ – *našti* 'cannot', *phagili*$_{\text{PF.3SG.F}}$ – *phagel* 'break', *tradije*$_{\text{PF.3PL}}$ – *tradel* 'chase away', *vazdija*$_{\text{PF.3SG}}$ – *vazdel* 'lift (up)', *uštilo*$_{\text{PF.3SG.M}}$ – *uštel* 'wake up'. A single example was attested with the marker *-salj-*<*-sajl-*: the reflexive verb *irisaljo*$_{\text{PF.3SG}}$ – *iril pe* 'return'.

[27] The similar distribution of perfective markers is observed in Mitrovica Gurbet Romani (Leggio 2011: 88-89).
[28] This marker underwent jotization in certain cases, producing the variant *-ij-*.

The perfective forms of the monoconsonantal stems *d-* 'give' and *l-* 'take'/'begin, undertake' are formed by attaching the perfective markers through a glide insertion: *dija*$_{\text{PF.3SG}}$ – *del* 'give', 'score' and *lija*$_{\text{PF.3SG}}$ – *lel* 'take'/'begin, undertake'.

Several verbs which manifest lexical alternations are also attested, e.g. *djelo*$_{\text{PF.3SG}}$ – *džal* 'go', *djilotar*$_{\text{PF.3SG}}$ – *džaltar* 'go away, leave', *pelo*$_{\text{PF.3SG.M}}$/*peli*$_{\text{PF.3SG.F}}$ – *perel* 'fall', *suta*$_{\text{PF.3SG}}$ – *sovel* 'sleep'. These verbs are reported to have undergone an irregular stem alternation *sov-* > *sut-*, *per-* > *pel-*, or even suppletion *dža-* > *ge-l-* (Matras & Elšík 2006: 198).

In addition, the material used in the study provided an insight into one prominent Romani feature, namely the past participle agreement. Although this phenomenon goes beyond the scope of the paper, it is worth mentioning that the Gurbet Romani has retained this feature. Past participle with adjectival agreement is attested in the 3SG past tense of certain intransitive verbs, e.g. *o*$_{\text{M}}$ *slono*$_{\text{M}}$ *avilo*$_{\text{M}}$ 'the elephant came', *e*$_{\text{F}}$ *čiriklji*$_{\text{F}}$ *avili*$_{\text{F}}$ 'the bird came'; *o*$_{\text{M}}$ *iv*$_{\text{M}}$ *pelo*$_{\text{M}}$ 'the snow fell', *e*$_{\text{F}}$ *kugla*$_{\text{F}}$ *goja*$_{\text{F}}$ *peli*$_{\text{F}}$ 'the ball that fell', *e*$_{\text{F}}$ *čiriklji*$_{\text{F}}$ *ačhili*$_{\text{F}}$ 'the bird landed', *goja*$_{\text{F}}$ *kugla*$_{\text{F}}$ *phagili*$_{\text{F}}$ 'that ball broke', *goja*$_{\text{F}}$ *krugla*$_{\text{F}}$ *pharrli*$_{\text{F}}$ 'that ball cracked/burst', *o*$_{\text{M}}$ *slono*$_{\text{M}}$ *ćerdilo*$_{\text{M}}$ *po sneško beli(ć)* 'the elephant turned into the snowman', *o*$_{\text{M}}$ *slono*$_{\text{M}}$ *ćerdili*$_{\text{F}}$ *jekh lopta*$_{\text{F}}$ 'the elephant turned into a (snow)ball'. This phenomenon is reported in other present-day Romani dialects as plain adjectival-participial concord with no person markers (Matras 2001: 169).[29] In the group of intransitive verbs, this feature usually affects verbs of motion and change of state, but it is subject to dialectal variation (Matras 2001: 174).

4. Discussion

The analysis of verbal aspect in the narratives obtained from elementary-school children showed that the vast majority of verbs in the overall sample of Gurbet Romani verbs and Serbian loanverbs are marked with a perfective marker (80.6%) and that those verbs which bear perfective markers mostly refer to completed events (88.6%).

The prevalence of the verbs with perfective markers has been expected since the task required retelling the series of events from the cartoons, and the

[29] The active participle has been preserved in the dialects of southeastern Europe, it is facultative in the transition regions between the Balkans and Central Europe, but outside the Balkan regions, in Northern and Central Northern dialects it has disappeared (Matras 2001: 173; Matras 2004: 44). This characteristic is seen as one of the linguistic features which are important for the classifications of Romani dialects (Matras 2005: 15).

perfective forms play an important role in narrative construction. The results conform to various accounts on narrative structure, showing that the perfective forms are more common and more frequent, and thus unmarked in narratives (Fludernik 1991; Holzinger 1996; Savić, Popović & Anđelković 2017), allowing a speaker to distinguish between more and less important information in storytelling and mark salient events with perfective forms (Slabakova 2002).[30]

Regarding the aspectual system, the main results of the pilot study could be summarized as follows: perfective markers are added to the verb stems to express completed events; ongoing events are typically unmarked for perfectivity; verbs unmarked for perfectivity additionally refer to completed events; Serbian loanverbs, morphologically adapted to Romani, are used to convey the aspect; and perfectivity is additionally achieved by borrowing Serbian prefixes.

In the sample of Romani verbs, the perfective (completed) events are usually marked by adding a perfective marker to the verb stem, e.g. *ćerda*$_{\text{PF}}$ – *ćerel* 'make', *dikhla*$_{\text{PF}}$ – *dikhel* 'see', *avilo*$_{\text{PF}}$ – *avel* 'come'. Ongoing actions are unmarked for perfectivity and take the form of the present tense, e.g. *phirel*$_{\text{NON-PF}}$ – *phirel* 'walk'. These results support previous claims that Romani verbs marked with a perfective marker commonly refer to completed events, while the verbs without the overt aspectual marker refer to ongoing events and make no distinction between the moment of speaking and the moment of the event (cf. Matras 2001; Matras 2004; Matras & Elšík 2006). As Matras and Elšík pointed out (2006: 82-83), even though traditional Romani grammars refer to the non-perfective present/future and the perfective past (preterite, aorist) as 'tenses', the opposition non-perfective : perfective may be regarded as aspectual.

Serbian loanverbs attribute to the lexico-aspectual meaning. The fact that the perfective markers are preserved even in loanverbs supports the idea of the conservative tense-aspect system in Romani (Matras 2001). Serbian perfective loanverbs with the adapted perfective markers (*-sard-* or *-salj-*) express completed events, e.g. *okrenisaljo*$_{\text{PF}}$ 'turn around' < Serb. *okrenuti se*$_{\text{PF}}$ 'turn around', whereas Serbian imperfective loanverbs without perfective markers express ongoing events, e.g. *čitol*$_{\text{NON-PF}}$ 'read' < Serb. *čitati*$_{\text{IMPF}}$ 'read'. In several cases, Serbian imperfective verbs are used with perfective markers to mark completed events instead of their

[30] The perfective verbs were previously reported as prevailing in the experiments conducted with Serbian-speaking preschool-aged children and adults which used the same experimental materials (Savić, Popović & Anđelković 2017). The study showed that the achievement verbs prevailed in different age groups as they are useful for the expression of flow and dynamics of activity in a narrative.

perfective counterparts, e.g. *rušisaljo*$_{PF}$ 'knock down' < Serb. *rušiti*$_{IMPF}$ instead of Serb. *srušiti*$_{PF}$ with a resultative meaning. Perfectivity is additionally achieved by borrowing Serbian prefixes, e.g. *<u>za</u>suto* < Serb. prefix *za-* added to the form *suto*$_{PF}$ 'sleep' analogous to Serbian *<u>za</u>spati*$_{PF}$ 'fall asleep' in order to mark the aktionsart.[31] The obtained data regarding loanverbs and borrowed prefixes support the empirical research which shows highly productive loanverb adaptation of Serbian verbs to Romani (Ćirković & Mirić 2018), as well as the findings on borrowed Slavic aspect prefixes (Friedman 2001; Igla 1998; Matras 2001; Kiefer 2010) and various verbal particles in Romani dialects in contact with Hungarian or German (Bodnárová & Wiedner 2015; Elšík 2007; Kiefer 2010; Matras 2001). As pointed out in these studies, the purpose of borrowing in the domain of aspect is to assign aktionsart or change the lexical meaning of a verb.

Even though the results of the study support previous theoretical claims on the aspectual system in Romani, the relation between the perfectivity and the completion of events does not always seem straightforward.

Firstly, perfective markers may be attached to a verb stem to refer to incomplete events, e.g. *asaje*$_{PF}$ – *asal* 'laugh'; *čitosarda*$_{PF}$ 'read' < Serb. *čitati*$_{IMPF}$ 'read'. In the interpretation we follow Holzinger (1996: 118), who proposes that the perfective can be used for non-sequential events if their internal temporal contour is not important. Since the perfective is unmarked, in this case it presents an event as a whole. Holzinger's analysis is based on the verbal aspect in the Sinte Romani narrative discourse of adult speakers.[32] The alternative explanation would be that it is the temporal perspective which is being marked, rather than the aspectual one: verbs with a perfective marker specify the distinction between the moment of the event in the cartoon which happened prior to the moment of speaking (retelling).

Furthermore, the non-perfective forms refer to completed events, e.g. *čalavel*$_{3SG}$ 'hit', *peravel*$_{NON\text{-}PF}$ 'knock down'. The literature on the acquisition of aspect also showed that imperfective forms might be associated with completed activities in children's production, but also in children's and adults' comprehension (cf. García del Real, van Hout & Ezeizabarrena 2014; Vinnitskaya & Wexler 2001;

[31] The prefix *za-* is also productive in the speech of the adult speakers of the Gurbet Romani (cf. example (1f)). In addition, Igla (1998) observed that the prefixes *iz-* and *za-* are frequently borrowed prefixes in the Bulgarian Romani varieties.

[32] According to perspective-based theories on grammatical aspect (see Demirdache & Uribe-Etxebarria 2005, among others), perfective forms focus on the event as a whole, while imperfective forms focus on a narrow temporal interval of the event that excludes its endpoint.

among others). In our study, the verbs lacking a TAM marker are used either: a) for narrative purposes, in the form of the narrative present, as it is common in storytelling, or b) to emphasize iterativity of certain events. The use of non-perfective forms to mark completion in narratives may indicate that the non-perfective forms are used for narrative purposes, as the narrative present tense, as it has already been suggested in the studies of adults' production (cf. Fludernik 1991, among others). It has been argued that at least in the Indo-European languages there is a common pattern of episodic narrative and that the historical/narrative present occurs at specified points within this narrative (Fludernik 1991). This pattern holds for written, literary narratives and natural, conversational narratives characteristic of the oral storytelling. The purpose of the narrative present tense is to signal "tellable events, dynamically relating them to statements in the preterite that guide the listener's evaluation of these events, marking the 'point' of the story" (Fludernik 1991: 392).[33] According to Holzinger (1996: 118), the narrative present in the Sinte Romani narratives has the same general function as perfective. Furthermore, the non-perfective forms may be used in order to emphasize the iterativity of the event, to mark telic events which show up repeatedly.

One should also bear in mind that the personal perspective on the observed events plays a role in expressing aspect, which is supported by the variability across participants in describing the same event. According to Matras, perfective encodes a subjective perspective on the event as completed, with no reference to its internal phases (Matras 2001: 165). We believe that the 'subjective perspective' can be extended to the ongoing events as well. If a speaker focuses on the activity itself, s/he might opt for a non-perfective form, whereas choosing a perfective form might indicate a focus on the endpoint of an event.

Exceptions from the main trends support the claim that in Romani "tense, aspect and mood functions do not combine in a completely transparent way" (Matras & Elšík 2006: 188), and signal that the use or the absence of perfective markers should be interpreted beyond their aspectual functions, pertaining to the domain of temporality, narrative flow and dynamics, as well as the personal perspective on the observed or experienced events. As pointed out by Holzinger (1996), the function and the use of aspectual forms cannot be analyzed in isolation, as they are just one of the means to express thematic organization of the discourse.

Finally, certain limitations of the study should be discussed. The paper is based on a pilot experimental study, which could not capture the overall tense-

[33] For similar accounts on tense variation and switching, see Chafe (1979), Schiffrin (1981), Fleischman (1990), Ćirković (2012).

aspect system in the Gurbet variety. In order to fully grasp the system, further research is necessary. Spontaneous narratives ought to be analyzed, as they could provide the insight into the larger corpus of Romani verbs and also enable us to investigate the adaptation of loanverbs in the domain of aspect, as well as the potential borrowing of other Serbian verbal prefixes. Additionally, the study included only a small sample of elementary-school children as participants whose linguistic competence was treated as adult-like. An experimental study involving more participants is required: including preschool-age participants would allow us to explore aspect from the developmental perspective, whereas the data from adult speakers as a control group could be compared to the data obtained from elementary-school children.

5. Concluding remarks

The study examined the verbal aspect in the Gurbet variety of Romani in 7 bilingual children aged 7 to 10 from the village of Minićevo in eastern Serbia. The results obtained in the study could be used as a relevant basis for the further investigations of the aspectual system in Romani varieties. The research confirmed the previous observations that perfective markers in Romani are typically used to refer to completed events, but it also revealed some exceptions, suggesting that the choice of a verb form (perfective vs. non-perfective) might refer to the temporal dimension of an event, to its iterativity, or might serve for the narrative purposes.

The conducted experimental research and the materials used in the experiments proved to be a useful means for investigating the aspect, as they allowed to analyze the verbs against the actual events in the cartoons. In this way, the most natural setting was established for eliciting verbal aspect.

References

2011 Census – 2011 *Census of Population, Households and Dwellings in the Republic of Serbia*. *Book 4: Religion, mother tongue and ethnicity*. Statistical office of the Republic of Serbia.

Antinucci, F. & Miller, R. (1976). How Children Talk about What Happened. *Journal of Child Language, 3*, 167-189.

Arsenijević, B. (2006). *Inner aspect and telicity. The decompositional and the quantificational nature of eventualities at the syntax-semantics interface*. Utrech: LOT.

Bakker, P. & Matras, Y. (1997). Introduction. In Y. Matras, P. Bakker & H. Kyuchukov (Eds.), *The Typology and Dialectology of Romani* (pp. vii-xxx). Amsterdam: John Benjamin Publishing Co.

Bodnárová, Z. & Wiedner, J. (2015). A comparative study of verbal particles in varieties of Vend Romani. *Romani Studies, 5*, *25*(2), 197-216.

Boretzky, N. (2003). *Die Vlach-Dialekte des Romani. Strukturen – Sprachgeschichte – Verwandschaftsverhältnisse – Dialektkarten*. Wiesbaden: Harrassowitz Verlag.

Boretzky, N. & Igla, B. (1994). *Wörterbuch Romani-Deutsch-Englisch für den südosteuropäischen Raum*. Wiesbaden: Harrassowitz.

Bronckart, J. & Sinclair, H. (1973). Time, Tense and Aspect. *Cognition, 2*(1), 107-130.

Chafe, W. L. (1979). The flow of thought and the flow of language. In T. Givón (Ed.), *Discourse and Syntax*. *Syntax and Semantics 12* (pp. 159-181). New York: Academic Press.

Comrie, B. (1976). *Aspect. An Introduction to the Study of Verbal Aspect and Related Problems*. Cambridge: Cambridge University Press.

Ćirković, S. (2012). *Stereotip vremena u diskursu raseljenih lica sa Kosova i Metohije* [The stereotype of time in the discourse of displaced persons from Kosovo and Metohija]. Beograd: Balkanološki institut SANU.

Ćirković, S. & Mirić, M. (2017). Romsko-srpski rečnik knjaževačkog gurbetskog govora [A Romani-Serbian dictionary of the Knjaževac Gurbet variety]. Knjaževac: Narodna biblioteka "Njegoš".

Ćirković, S. & Mirić, M. (2018). Loan-verb adaptation in Gurbet Romani in Knjaževac (Eastern Serbia). *13th International Conference on Romani Linguistics (ICRL13)*, 13-14th September 2018, LACITO laboratory, University Sorbonne Nouvelle, Paris, France. Abstract available at: http://lacito.vjf.cnrs.fr/colloque/romani/resumes_en.htm#cirkovic-miric

Demirdache, H. & Uribe-Etxebarria, M. (2005). Aspect and temporal modification. In P. Kempchinsky & R. Slabakova (Eds.), *Aspectual inquiries* (pp.191-221). Dordrecht: Kluwer Academic Publishers.

Elšik, V. (1997). Towards a morphology-based typology of Romani. In Y. Matras, P. Bakker & H. Kyuchukov (Eds.), *The Typology and Dialectology of Romani* (pp. 23-59). Amsterdam: John Benjamin Publishing Co.

Elšík, V. (2007). Grammatical borrowing in Hungarian Rumungro. In Y. Matras & J. Sakel (Eds.), *Grammatical borrowing in cross-linguistic perspective* (pp. 261-282). Berlin: Mouton de Gruyter.

Fleischman, S. (1990). *Tense and Narrativity: From Medieval Performance to Modern Fiction. Texas Linguistics Series*. Austin: University of Texas Press.

Fludernik, M. (1991). The historical present tense yet again: Tense switching and narrative dynamics in oral and quasi-oral storytelling. *Text, 11*(3), 365-397.

Friedman, V. (2001). Romani multilingualism in its Balkan context. *STUF, 54*(2), 148-161.

Gagarina, N. (2004). Does the acquisition of aspect have anything to do with aspectual pairs? *ZAS Papers in Linguistics, 33*, 39-61.

García del Real, I., van Hout, A. & Ezeizabarrena, M. J. (2014). Comprehension and Production of Grammatical Aspect in Child Spanish: Semantics vs. Pragmatics. In C-Y. Chu et al. (Eds.), *Selected Proceedings of the 5th Conference on Generative Approaches to Language Acquisition North America (GALANA 2012)* (pp. 99-110). Somerville, MA: Cascadilla Proceedings Project.

Hancock, I. (1995). *A Handbook of Vlax Romani*. Slavica Publications, Inc.

Holzinger, D. (1996). Verbal Aspect and Thematic Organization of Sinte Narrative Discourse. *Grazer Linguistische Studien, 46*, 111-126.

Igla, B. (1992). Entlehnung und Lehnübersetzung deutscher Präfixverben im Sinti. In J. E. Benedikt & M. P. Bochum (Eds.), *Prinzipien des Sprachwandels I. Vorbereitung* (pp. 38-56). Bochum: Brockmeyer.

Igla, B. (1998). Zum Verbalaspekt in Bulgarischen Romani-Dialekten. *Grazer Linguistische Studien, 50*, 65-79.

Kazanina, N. & Phillips, C. (2007). A developmental perspective on the imperfective paradox. *Cognition, 105*, 65-102.

Kiefer, F. (2010). Areal-typological aspects of word-formation: The case of aktionsart-formation in German, Hungarian, Slavic, Baltic, Romani and Yiddish. In F. Rainer, W. U. Dressler, D. Kastovsky & H. C. Luschützky (Eds.), *Variation and change in morphology* (pp. 129-147). Amsterdam: John Benjamins.

Leggio, V. D. (2011). The dialect of the Mitrovica Roma. *Romani Studies, 21*(1), 57-114.

Matras, Y. (2001). Tense, aspect and modality categories in Romani. *STUF, 54*(2), 162-180.

Matras, Y. (2004). *Romani. A Linguistic Introduction*. Cambridge University Press.

Matras, Y. (2005). The classification of Romani dialects: A geographical-historical perspective. In D. Halwachs & B. Schrammel (Eds.), *General and applied Romani linguistics* (pp. 7-26). Munich: Lincom Europa.

Matras, Y. & Elšík, V. (2006). *Markedness and language change: the Romani sample*. Berlin / New York: Mouton de Gruyter.

Matras, Y. & Tenser, A. (2016). Complementizers in Romani. In K. Boye & P. Kehayov (Eds.), *Complementizer semantics in European languages: Workshop on Semantic Functions of Complementizers in European Languages. Empirical approaches to language typology 57* (pp. 341-375). Berlin: Mouton De Gruyter.

Mirić, M. (2019). Izazovi i značaj izvođenja nastave romskog jezika u Knjaževcu i okolini [The challanges and importance of Romani language classes in Knjaževac and the surroundings]. In M. Sibinović, V. Stojadinović & D. Popović Nikolić (Eds.), *Knjaževački kraj – potencijali, stanje i perspektive razvoja* (pp. 158-178). Knjaževac: Narodna biblioteka „Njegoš".

Mirić, M. & Ćirković, S. (2018). Report on documenting the Gurbet Romani variety in East Serbia and creating the Romani-Serbian dictionary. *Studia Ethnologica Pragensia, 1/2018*, special issue *Roma: Ethnological Reflections*: 105-113.

ROMLEX – http://romani.uni-graz.at/romlex/ Accessed 2nd Sept. 2019.

Savić, M., Popović, M. & Anđelković, D. (2017). Verbal aspect in Serbian children's language production. *Psihologija, 50*(4), 427-444.

Schiffrin, D. (1981). Tense variation in narrative. *Language, 57*(1), 45-62.

Shirai, Y. & Andersen, R. (1995). The Acquisition of Tense-Aspect Morphology: a Prototype Account. *Language, 71*(4), 743-762.

Sikimić, B. (Ed.) (2018). *Jezik i tradicija knjaževčkih Roma* [The language and tradition of Knjaževac Roma]. Knjaževac: Narodna biblioteka "Njegoš".

Slabakova, R. (2002). Recent research on the acquisition of aspect: an embarrassment of riches? *Second Language Research, 18*(2), 172-188.

Stoll, S. (2001). *The Acquisition of Russian Aspect.* Unpublished PhD Dissertation. University of California, Berkeley.

Vendler, Z. (1957). Verbs and times. *Philosophical Review, 56,* 143-160.

Vendler, Z. (1967). *Linguistics in philosophy*. Ithaca, New York: Cornell University.

Vinnitskaya, I. & Wexler, K. (2001). The role of pragmatics in the development of Russian aspect. *First Language, 21*(62), 143-186.

Weist, R., Wysocka, H., Witkowska-Stadnik, K. & Buczowska, E. (1984). The defective tense hypothesis: On the emergence of tense and aspect in child Polish. *Journal of Child Language*, *11*, 347-374.

Appendix 1

Cartoon 1

A mouse approached a large hanging bell. It looked at the bell for several seconds and knocked on it twice. It bent over and looked under the bell. Then it tried to move the bell by pushing it with its hands for several seconds. It couldn't move the bell. Then the mouse turned around and tried to move it by pushing it with its back for several seconds but nothing happened. Then the mouse turned around and looked at the bell. It tried to kick the bell and fell. An elephant came, looked at the mouse and made a noise. The mouse also made a noise and started swinging its hands. The elephant moved the bell with its trunk. The bell started moving and ringing. The mouse and the elephant stood and looked at the bell. The mouse smiled.

Cartoon 2

An elephant was standing next to a cake, putting whipped cream on the top of the cake. It finished the cake and left. A mouse came with newspapers in its hands, holding it in front of its eyes, unable to see the cake. It hit at the cake and destroyed it. The mouse looked at the cake, and then he looked at the newspapers and threw them away. Then an elephant came with a candle in its hand. The elephant looked at the cake, opened its eyes wide and made an angry noise. It threw the candle away. Then the elephant took the cake and threw it in the mouse's face. The mouse took the cake off of its face and threw it in the elephant's face. Then they threw the cake at each other twice more. Then they started eating the cake and ate it all up.

Cartoon 3

An elephant was sleeping in a football goal. A mouse came with a ball. It put the ball on the ground and kicked it towards the goal. The elephant caught the ball with its trunk, while still sleeping, and threw it back to the mouse. The mouse hit the ball with its head towards the goal and the elephant caught it again, still sleeping, and threw it back towards the mouse. The mouse kicked it again, but the elephant again defended with its trunk. The mouse stood and thought and then it smiled. It took an apple out of its pocket and threw it towards the right corner of the goal. The elephant caught the apple with its trunk. The left corner of the goal was free, and the mouse kicked the ball and scored. The mouse cheered. At the same time, the elephant woke up and stood up. It first looked at the ball, then he ate the apple, lay down and fell asleep.

Cartoon 4

The snow was falling. A mouse was walking, then stopped and started looking in front of itself. A large snowball rolled down the hill and stopped in front of the mouse. The mouse jumped backwards. The snowball started moving. The mouse first moved backward and then around the moving snowball. The snowball hit the mouse in its bottom, started chasing it and the mouse ran from the snowball. The mouse turned its head around to look back at the snowball, tripped on a small stone and fell. The snowball hit the same stone and burst. An elephant appeared from the snowball. The mouse and the elephant looked at each other and smiled. The elephant shook the off from its body. The mouse took the snow from the ground and threw it at the elephant, who made a noise and sat down.

Cartoon 5

An elephant and a mouse were making a house from wooden objects such as cubes. When they put the last piece on the top of the house as the roof, a bird flew into the room, landed on the top of the house and knocked it down. Then the bird landed on a wooden shelf on the wall. It looked down at the mouse and the elephant and they looked at the bird. The mouse and the elephant started making the house again piece by piece and the bird watched them. Before they finished, the bird started flying and the house knocked down. The elephant yelled at it and the mouse tried to chase the bird away. The bird covered its eyes with its wings. The elephant and the mouse started building the house again. When they finished it, they made a step backward, looked at the house, then looked at the bird, who was looking at the house. A feather fell on the top of the house and knocked it down. The bird covered its eyes with its wings. The elephant and the mouse started laughing.

Appendix 2

The table presents the verbs excerpted for the purpose of this paper. First, the Romani verbs are given, followed by Serbian loanverbs, in alphabetical order. For each verb type, the lemma and its meaning are given, followed by the frequency of tokens in the overall sample and the number of participants who used the verb type. In the part regarding Serbian loanverbs, a star next to a lemma signifies that the lemma has not been previously attested in the relevant literature. The question mark signifies an unknown lemma.

ROMANI VERBS				
Verb type	Lemma (3SG)	Meaning	Freq of tokens	N of participants
ačhel$_{3SG}$	ačhel	‘stand’, ‘stop’, ‘land’	2	1
ačhili$_{PF.3SG.F}$			2	1
arakhla$_{PF.3SG}$	arakhel	‘find’	1	1
asan$_{3PL}$	asal	‘laugh’	2	2
asaje$_{PF.3PL}$			1	1
astarda$_{3SG.PF}$	astarel	‘catch’	1	1
avel$_{3SG}$	avel	‘come’	3	2
avilo$_{PF.3SG.M}$			2	2
avili$_{PF.3SG.F}$			19	6
crdel$_{3SG}$	crdel	‘pull’	1	1
čalavel$_{3SG}$	čalavel	‘hit’, ‘kick’	1	1
čalada$_{PF.3SG}$			4	3
čhudel$_{3SG}$	čhudel	‘throw’, ‘kick’	6	4
čhudija$_{PF.3SG}$			8	4
čhudije$_{PF.3PL}$			1	1
ćeren$_{3PL}$	ćerel	‘do’, ‘make’	1	1
ćerda$_{PF.3SG}$			4	3
ćerde$_{PF.3PL}$			8	4
ćerdilo$_{PF.3SG.M}$	ćerdol	‘turn into’	1	1
ćerdili$_{PF.3SG.F}$			1	1
ćharda$_{PF.3SG}$	ćharel	‘crush’	1	1
ćhelen$_{3PL}$	ćhelel	‘play’	1	1

del$_{3SG}$	del	‘give’ / ‘score’	5	4
dija$_{PF.3SG}$			5	5
dikhel$_{3SG}$	dikhel	‘see’, ‘look’	2	2
dikhla$_{PF.3SG}$			3	3
džal$_{3SG}$	džal	‘go’	1	1
djelo$_{PF.3SG}$			2	1
djilotar$_{PF.3SG}$	džaltar	‘go away’, ‘leave’	1	1
ikalda$_{PF.3SG}$	i(n)kalel	‘take out’	1	1
ikljel$_{3SG}$	i(n)kljel	‘go out’	1	1
ikljilo$_{PF.3SG}$			1	1
irisaljo$_{PF.3SG}$	iril pe	‘return’	1	1
istarda$_{PF.3SG}$	istarel	‘catch’	4	3
lel$_{3SG}$	lel	‘take’, ‘begin, undertake’	3	2
lija$_{PF.3SG}$			10	5
lije$_{PF.3PL}$			2	2
mangel$_{3SG}$	mangel	’want’	1	1
mangla$_{PF.3SG}$			3	1
marda$_{PF.3SG}$	marel	‘hit’, ‘beat’	1	1
našti	našti	‘cannot’	4	3
naštija$_{PF.3SG}$			3	2
naštisarda$_{PF.3SG}$	naštisarel	‘cannot’	4	2
perel$_{3SG}$	perel	‘fall’	1	1
pelo$_{PF.3SG.M}$			4	4
peli$_{PF.3SG.F}$			3	1
peravel$_{3SG}$	peravel	‘knock down’, ‘ruin’	3	1
perada$_{PF.3SG}$			2	1
phagel$_{3SG}$	phagel	‘break’	1	1
phagili$_{PF.3SG.F}$			1	1
pharrada$_{PF.3SG}$	pharravel	‘break’, ‘tear’	1	1
pharrli$_{PF.3SG.F}$	pharrol	‘crack’, ‘burst’	1	1
phirel$_{3SG}$	phirel	‘walk’	2	1
sasa$_{3SG.REM}$	si	‘be’	8	4
si le$_{3SG.M}$	si le	‘have’	1	1

sovel$_{3SG}$	sovel	‘sleep’	2	2
sovda$_{PF.3SG}$			2	2
sovela$_{3SG.REM}$			1	1
suta$_{PF.3SG}$			1	1
thol$_{3SG}$	thol (pe)	‘put’, ‘place’	5	3
thoda$_{PF.3SG}$			3	2
thode$_{PF.3PL}$			2	1
traden$_{3PL}$	tradel	‘chase away’	1	1
tradije$_{PF.3PL}$			1	1
uštilo$_{PF.3SG.M}$	uštel	‘wake up’	3	1
vazdija$_{PF.3SG}$	vazdel	‘lift (up)’	1	1
xala$_{PF.3SG}$	xal	‘eat’	1	1
xale$_{PF.3PL}$			1	1
zasuto$_{PF.3SG}$	zasovel?	‘fall asleep’	1	1

SERBIAN LOANVERBS

Verb type	Lemma (3SG)	Meaning	Freq of tokens	N of participants
branisarda$_{PF.3SG}$	branil*	‘defend’	2	1
crtosarda$_{PF.3SG}$	crtol	‘draw’, ‘paint’	1	1
čitol$_{3SG}$	čitol	‘read’	2	2
čitosarda$_{PF.3SG}$			1	1
čudisaljo$_{PF.3SG}$	čudil*	‘wonder’	1	1
gadjisarde pe$_{PF.3PL}$	gadjil pe*	‘shoot’, ‘throw’	1	1
guril$_{3SG}$	guril*	‘push’	1	1
gurisarda$_{PF.3SG}$			5	4
krenisarda$_{PF.3SG}$	krenil*	‘set off’	1	1
nervirisarda$_{PF.3SG}$	nerviril*	‘to be annoyed’	1	1
okrenisaljo$_{PF.3SG}$	okrenil*	‘turn around’	1	1
pomerisaljo$_{PF.3SG}$	pomeril*	‘move’	1	1
pomožisarda$_{PF.3SG}$	pomožil	‘help’	1	1
probisarda$_{PF.3SG}$	probil*	‘try’	4	2
razmazisarda$_{PF.3SG}$	razmazil*	‘spread’	1	1
rušisaljo$_{PF.3SG}$	rušil	‘knock down’, ‘ruin’	1	1

sapletisaljo$_{PF.3SG}$	sapletil (pe)*	‘trip’	1	1
šutiril$_{3SG}$	šutiril*	‘kick’	2	2
šutirisarda$_{PF.3SG}$			1	1
uhvatil$_{3SG}$	uhvatil	‘catch’	1	1
zvonil$_{3SG}$	zvonil	‘ring’	1	1

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REFLEXIVE AND ANTI-CAUSATIVE VERB PRODUCTION AT DIFFERENT STAGES OF LANGUAGE ACQUISITION IN SERBIAN[1]

Abstract: The aim of the present research was to test the production of reflexive and anti-causative *se*-verbs in Serbian at different stages of language acquisition. The verbs which were tested were true reflexive (e.g. *kupati se* 'wash oneself'), lexical reflexive (e.g. *vrteti se* 'spin') and anti-causative *se*-verbs (e.g. *otvoriti se* 'open'). None of the tested types is syntactically simple, because they do not involve canonical linking of semantic roles and syntactic functions (agent-subject and patient-object). However, it was expected that reflexive verbs would be acquired before anti-causative verbs, since they are syntactically less complex. A total of sixty subjects belonging to three age groups (31-42, 43-55, 56-68 months-twenty participants in each group) took part in the research. The data collection technique was a structured interview with a verb elicitation task. The children were asked to name the activities presented in the pictures. The number of tested verbs was the same for each verb type (six per group). The production of verbs across age groups showed that children had no difficulty producing true or lexical reflexive *se*-verbs. Therefore, the results speak in favor of the Continuity Hypothesis, which proposes that children are sensitive to syntactic differences from the earliest age. On the other hand, anti-causative verbs, which involve a complex process of detransitivization, were produced much less accurately across groups. Non-target answers in this verb group suggest that children tend to come up with implicit agents. This phenomenon has already been noted in previous research (Roeper 1987; Bowerman 1991; Verrips 2000; Ilić Matijević 2017). Since some anti-causatives were produced even at the earliest tested age, I believe that the lower production of anti-causative verbs should not be attributed to the problem with A-chains (as would be assumed under the Maturation Hypothesis), but rather to the process of detransitivisation and deletion of +cause theta role.

Key words: verb production, reflexive verbs, anti-causative verbs, L1 acquisition

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1. Introduction

A special group of verbs in Serbian, which appear with the clitic *se*, has been particularly interesting for syntacticians because the status of the clitic *se* has not been fully defined yet. Moreover, *se*-verbs appear in a multitude of syntactic conditions. Research into the acquisition of *se*-verbs in Serbian would be beneficial for our understanding of the acquisition of verbs with different argument structures, because it would test whether children have more difficulty producing syntactically more complex *se*-verbs.

The aim of the present research is to test the production of true reflexive, lexical reflexive and anti-causative *se*-verbs at different stages of language acquisition. Following Pinker's (1984, 1989) linking rules and the results of previous studies on the acquisition of reflexive (Snyder, Hyams & Crisma 1995) and anti-causative verbs (Roeper 1987; Bowerman 1991; Verrips 2000; Ilić Matijević 2017), it is expected that true reflexive verbs are acquired first, and that anti-causative verbs are acquired only at later stages of language acquisition, because they have alternating transitivity and are syntactically more complex.

Regarding the structure of the paper, section 2 will deal with the theoretical background. First, three different approaches to *se*-verbs will be discussed. An overview of the most important studies on the acquisition of reflexive and anti-causative verbs will be provided next, after which the aim and hypotheses of the study will be defined. After the theoretical background, in section 3, a detailed description of the method, the participant profile and the procedure of the research will be given. Section 4 will deal with the analysis of the results obtained. Finally, in section 5, we will summarize the main contributions of the research, discuss the limitations of the study, and provide suggestions for future research.

2. Theoretical background

2.1 Verbs with the clitic se in Serbian

2.1.1 Traditional approach to se-verbs

In traditional Serbian grammars, the clitic *se* is taken as a sign of reflexivity, even though it appears in a multitude of syntactic conditions. The most widely accepted classification of Serbian reflexive verbs is the one into true reflexive, quasi reflexive and reciprocal reflexive verbs (Stanojčić & Popović 2002). True reflexive verbs denote activities which the agent of the verb performs

on himself/herself. In this case, the clitic *se* is interpreted as the accusative case of the reflexive pronoun *sebe* 'self' (*kupati se* 'wash oneself'). On the other hand, quasi reflexive verbs denote activities or states in which the clitic *se* cannot be interpreted as the accusative case of the pronoun *sebe* 'self' (*igrati se* 'play'). Reciprocal reflexive verbs mark activities in which the agents perform activities on each other (*ljubiti se* 'kiss each other'). In traditional Croatian grammars, the classifications are either the same (Barić et al. 1997), or very similar, with the addition of categories such as miscellaneous reflexive verbs (Grubišić 2007).

As Samardžić (2006) points out, such a classification is not based on a unique criterion. While the meaning and function of the clitic *se* are taken as indicators of true reflexive verbs, its function is not defined with quasi reflexive verbs, and it is only stated how it cannot be interpreted. However, there have been many attempts to prove that the clitic *se* is not an object clitic (Reinhart & Siloni 2003; Marelj 2004; Samardžić 2006). These will be discussed next.

2.1.2 Generative approach to se-verbs

Reinhart and Siloni (2003) explain that different thematic variations of the same thematic concept are derived by means of arity operations, which can apply in both the lexicon and syntax. Arity operations are derivational operations which have an effect on the valency of the verb. As Reinhart and Siloni (2003) claim, in Serbo-Croatian both reflexivization and reciprocalization apply in syntax. The authors (2003) show how the clitic *se* appears in constructions in which the syntactic valency of the verb is reduced. The clitic *se* is a morphological component of the verb which reduces the accusative case. When it appears, the internal theta-role of the verb cannot be assigned to its canonical position and thus it remains unassigned until the external argument is merged. When the external argument is merged, bundling takes place, i.e. two theta-roles are assigned to the same argument.

That is how Reinhart and Siloni (2003) explain the possibility of the subject bearing two theta roles at the same time (those of Agent and Patient), which happens with reflexive verbs.

Moreover, whereas traditional classifications of *se*-verbs in Serbian do not provide any account of anti-causative verbs which also appear with the clitic *se*, this type is also included in their theory. Reinhart and Siloni (2005: 416) define decausativization (turning a transitive into an anti-causative verb) as the "reduction of an external [+c] role", which applies crosslinguistically only in the lexicon, as

opposed to the above-mentioned arity operations. The external argument is removed before the remaining argument is merged internally. At the final step of the derivation, after the internal argument is merged, it moves to a higher position, to satisfy the Extended Projection Principle (EPP) features of T.

Following Reinhart and Siloni (2003), Marelj (2004) claims that what all *se*-constructions (middles, passives, impersonals, reflexives, unaccusatives, frozen *se*-construction) have in common is that they are derived via arity operations. Marelj (2004) states that the clitic *se* is the nominative or accusative case absorber, even when it appears in "frozen" outputs, which do not have a transitive counterpart in the contemporary language. Therefore, Marelj (2004) suggests that these are diachronically derived entities.

Samardžić (2006) also shows how *se*-constructions undergo the process of detransitivization, i.e. the removal of the direct object from the syntactic representation. By analyzing alternations in the argument structure of ditransitive verbs, she provides further support for the claim that the function of the clitic *se* is to check and erase the case marker on the verb. She shows that the clitic *se* systematically appears when the nominative-accusative opposition disappears from a syntactic construction. Before we move to an overview of language acquisition studies on reflexive and anti-causative verbs, a lexical-functional approach to *se*-verbs will be presented.

2.1.3 Lexical-functional approach to se-verbs

Within the Lexical-Functional Grammar framework, Miličević (2015) offers a continuum of *se*-verbs. By taking into account three levels of analysis (thematic, argument and syntactic), Miličević (2015) shows that some *se*-verbs are closer to unaccusatives (inherently reflexive), whereas others are closer to unergatives (inherently reciprocal).

The continuum of unaccusative verbs begins with true reflexive verbs, which Miličević (2015) refers to as morpho-syntactically derived forms (e.g. *kupati se* 'wash oneself'), in which the Agent and Patient theta-roles are realized as co-referential arguments, which perform the function of the subject together at the level of syntax. On the other hand, the Agent argument is not realized in lexical reflexive verbs, exemplified in 1. Only the patient performs the function of the subject at the level of syntax in lexical reflexive verbs. However, the Agent argument is present in their thematic structure, since there are transitive variations in which the arguments are realized as the subject and object at the level of syntax,

which is illustrated in 2. Finally, some reflexive verbs are closer to unaccusative than to reflexive verbs (e.g. *pojaviti se* 'appear'), since they do not even have a transitive alternation (the proto-Agent is not present in their thematic structure). At the very end of this continuum (see Miličević 2015), come underived unaccusative verbs (e.g. *arrive* 'stići').

(1) Devojčica se okrenula.
girl.NOM SE turn around.3SG.FEM
'The girl turned around.'

(2) Devojčica je okrenula stranu.
girl.NOM is turn around.3SG.FEM page.ACC
'The girl turned over a page.'

The aim of this section was to illustrate different approaches to *se*-verbs in Serbian. It was shown how reflexive and anti-causative verbs differ both in the number of theta-roles that a verb assigns and in the verb semantics. Previous studies have shown the influence of syntactic and semantic complexity on the acquisition of verbs, which will be discussed next.

2.2 Acquiring reflexive and anti-causative verbs

2.2.1 Maturation or Continuity?

The results of the cross-linguistic research on the acquisition of verbs with different argument structure are not conclusive. Whereas some researchers have claimed that children's knowledge of verbs needs a certain amount of time to mature and to become native-like (which is in contrast with Pinker's (1984, 1989) ideas on the innateness of semantic notions and universal linking rules), others have argued that children possess early knowledge of argument structure. While the former approach supports the Maturation Hypothesis (Borer & Wexler 1987; Babyonyshev et al. 2001), the latter supports the Continuity Hypothesis (Snyder, Hyams & Crisma 1995; Lorusso, Caprin & Guasti 2005; Costa & Friedmann 2012).

Based on the observation that children have problems with passive constructions, Borer and Wexler (1987) formulated the A-chain Deficit Hypothesis (the ACDH), claiming that A-movement (movement to an argument position) is not available to children from the onset of acquisition, but that it needs some time

to mature. A-movement occurs with unaccusative, anti-causative, passive and raising constructions, when an argument moves from a lower position inside the VP to the position of the specifier of the TP. Therefore, under the Maturation Hypothesis, we would expect children to have difficulty acquiring unaccusative and anti-causative *se*-verbs in Serbian.

In contrast with Borer and Wexler's (1987) Maturation Hypothesis, Snyder, Hyams and Crisma (1995) found that children use different auxiliaries with reflexive and non-reflexive clitic pronouns successfully while acquiring French and Italian. In these languages, reflexive forms are used with the auxiliary *be*, whereas non-reflexive forms are used with the auxiliary *have*. Reflexive constructions are analyzed as unaccusative constructions, in which the direct object surfaces as the subject. Snyder, Hyams and Crisma's (1995) findings provide evidence against the idea that children have problems with unaccusative verbs, since one French-speaking child (ranging between the ages 2;1;9 and 3;3;12) and three Italian-speaking children (all younger than three) selected the right auxiliary almost without any mistakes. Different studies which looked into the data from even younger children have confirmed that children are sensitive to syntactic differences between unergative and unaccusative verbs from the earliest age (Lorusso, Caprin & Guasti 2005; Costa & Friedmann 2012). Under the Continuity Hypothesis, children are not expected to have difficulty producing reflexive verbs from the earliest age. What needs to be added though, is that some studies supporting the Continuity Hypothesis predicted difficulty with passive constructions (Snyder and Hyams 2008), not owing to the difficulty with A-chains, but to the fact that the child needs to relate the surface subject with an underlying direct object. Moreover, there is another argument (demoted subject) which interferes.

2.2.2 Evidence from a usage-based study

Interestingly, Brooks and Tomasello (1999) obtained results which support Pinker's hypothesis about narrow semantic constraints (Pinker 1989), which children need time to master. According to Pinker (1989), children need time to recognize which verbs can occur in particular constructions with different argument structure (e.g. the verb *break* can be used in both transitive and anti-causative constructions). In an experiment which included ninety-six children, Brooks and Tomasello (1999) tested Pinker's hypothesis that children base their use of verbs on their belonging to narrow-range semantic classes. The prediction was that the children would respect the assigned transitivity of a verb more often if

the verb belonged to a fixed transitivity class (either transitive or intransitive) than if it belonged to alternating transitivity verbs and this proved to be true. It was shown that it takes some time for children (from 2.5 years to 4.5 years) to recognize which verbs occur with which argument structures. Therefore, the results provide empirical support for Pinker's hypothesis (1989) about narrow semantic constraints.

2.2.3 Implicit agents with anti-causative verbs

Previous studies on verb acquisition have shown that children are likely to come up with implicit agents in their use of anti-causative verbs (Roeper 1987; Bowerman 1991; Verrips 2000; Ilić Matijević 2017). Roeper (1987) found that three-year-olds overgeneralise the implicit external argument to anti-causatives. Analyzing the corpus of early spontaneous speech from her two daughters, Bowerman (1991) found an anti-causative question of her daughter paired with an oblique agent ('How come these two broke? By who?'). After conducting different comprehension experiments with Dutch children between 4;2 and 6;9 years old, Verrips (2000) concluded that the overgeneral agents do not follow from adult syntax, and that children represent them as passives. Another interesting finding from this study was that there was no age effect found. Older children in this experiment were as likely as younger children to provide answers with implicit agents as response to anti-causative questions. Finally, in her study on verb production at different stages of language acquisition, Ilić Matijević (2017) found that the production of anti-causative verbs is delayed in comparison with other verb types. She also noted that children are likely to come up with implicit agents.

2.3 The aim and hypotheses of the study

The aim of the present research is to test the production of different kinds of *se*-verbs, namely true reflexive, lexical reflexive and anti-causative verbs. Taking into consideration the theoretical claims made in this section and all of the above-mentioned studies, the initial hypothesis is that anti-causative verbs are acquired after reflexive verbs, due to their greater syntactic and semantic complexity. Therefore, it is expected that their production will be the least accurate. True reflexive verbs proved to be the easiest type to learn in previous research on the acquisition of *se*-verbs in Croatian as L2 (second language) (Pavlinušić & Kelić 2011). Pavlinušić and Kelić (2011) looked into the L2 acquisition of true reflexive, reciprocal and quasi reflexive verbs and concluded

that the linguistic structures that mark prototypical semantic concepts are acquired first. Furthermore, it will be interesting to compare the acquisition of true and lexical reflexive verbs and see if the results replicate the findings from Pavlinušić and Kelić (2011).

3. Method

3.1 Subjects

A total of sixty monolingual Serbian-speaking subjects belonging to three age groups (twenty participants each) took part in the research. The age range in group 1 was 31-42 months (N=20, M=37.75, SD=2.88). The age of three was chosen as the starting point because that is usually the earliest age for testing children (Eisenbeiss 2010). Moreover, we tried to conduct the experiment with 2-year-old children, but it was impossible, because of their lack of attention on the task. The age range in group 2 was 43-55 months (N=20, M=50.65, SD=2.99); and it was 56-68 months in group 3 (N=20, M=61.55, SD=4.19). None of the children selected had any language impairment, learning disability or hearing loss. Kindergarten teachers provided all the children's relevant information (the child's birth date and information about their mother tongue). Children were tested in February 2019, in „Maslačak" kindergarten, „Radosno detinjstvo" preschool facility in Novi Sad.

3.2 Design

The independent variable was verb type with three levels (true reflexive, lexical reflexive, and anti-causative verbs). The dependent variable was verb production (coded as target or non-target). The data were analyzed with the Mixed Effects Logistic Regression (GLMER). Three GLMER analyses were conducted for each of the three age categories, for verb type with three levels. The effect of verb length and frequency was also examined. Verb frequencies were taken from Serbian Web Corpus (SrWaC). Verb length was quantified by counting the number of letters.

The data collection technique was a structured interview with a verb elicitation task. The number of tested verbs was the same for each verb type. Three verb types were tested in the experiment and there were six tested verbs per verb type, which makes a total of 18 target verbs presented to each participant:

1. true reflexive: *oblačiti se* ‘dress oneself’, *umivati se* ‘wash one’s face’, *brisati se* ‘wipe oneself’, *kupati se* ‘wash oneself’, *češljati se* ‘comb one’s hair’, *šminkati se* ‘put on make-up’;
2. lexical reflexive: *igrati se* ‘play’, *penjati se* ‘climb’, *vrteti se* ‘turn around’, *ljuljati se* ‘swing’, *spuštati se* ‘slide’, *smejati se* ‘laugh’;
3. anti-causative verbs: *otvoriti se* ‘open’, *zatvoriti se* ‘close’, *upaliti se* ‘turn on’, *ugasiti se* ‘go out’, *pokvariti se* ‘break’, *polomiti se* ‘break’.

3.3 Procedure

Parental consent forms were obtained prior to the testing for every child. Parents also gave their permission for the sessions to be audio-taped using a dictaphone/voice recorder. Parental consent form is given in Appendix 1. Sixty participants were tested in single sessions that lasted up to 10 minutes.

Each child was tested individually, in one of the rooms provided by the staff. The only people present were the interviewer and the interviewee. External noise was present in some cases, because the children in the kindergarten would move from one room to another or go outside. However, this did not have an influence on conducting the experiment. Other difficulties included children from the youngest group who avoided answering the question or started talking about a different topic. Some children also needed additional encouragement to start responding to the given stimuli. However, most children showed considerable interest and it was not difficult to focus their attention on the task.

First, the interviewer was introduced to the children who would be tested. They spent some time together before the testing began. The children were asked to name the activities presented in the pictures. Each stimulus contained two pictures. The examiner would tell the children what is presented in the first picture and elicit the answer for the second picture (Figure 1). All the stimuli are given in Appendix 2. The child was expected to look at the picture and the interviewer would ask him/her what the person in the picture was doing in the case of animate arguments of the verb (testing the production of true reflexive and lexical reflexive verbs) or what happened in the case of inanimate ones (testing the production of anti-causative verbs). An example of one situation is the following:

“Interviewer: She is painting here, and what is she doing here?
Interviewee: She is playing.
Interviewer: Good.”

Figure 1 – stimulus for the verb *igrati se* 'play'

An example of the whole interview is given in Appendix 3. The interviewer would give some positively neutral feedback and make a short break between two situations. If the child did not respond, the interviewer would repeat the question. If the child remained silent, the interviewer would go on to the next question.

3.4 Coding

Answers were coded as target when the children produced the target verb, or non-target when they did not give an answer or produced a non-target word. Self-corrections were allowed and the last response was considered for the analysis. Closely synonymous verbs, which belong to the same verb type, and therefore have the same number of arguments, were also accepted as target. Alternative verbs which do not belong to the same verb type were not accepted as target.

Non-target answers were codified in the following way:

1) Non-target verbs (e.g. *ona briše svoje lice sa ovim* 'she is wiping her face with this' instead of *šminka se* 'she is putting on make-up')
2) Verbs with full complements/implicit agents instead of their variants with the clitic *se* (e.g. *umiva lice* 'he is washing his face')
3) Target verbs without the clitic *se*
4) Made-up verbs
5) Nouns
6) Other (adjective *otvorena* 'open' instead of the verb 'open')

7) No answer.

4. Results

4.1 GLMER analyses

The results of the first GLMER analysis (age 3) presented in Table 1 suggest that lexical reflexive verbs were produced with greater success than anti-causative verbs (β=3.357; z=3.503; Pr(>|z|)=.000***), as well as true reflexive verbs in comparison with anti-causative verbs (β=2.055; z=2.661; Pr(>|z|)=.007**). Trial order effect was only marginal.

Random effects	*Variance*	*SD*
Subject : Intercept	.535	.731
Stimuli :Intercept	.374	.612

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept	-1.114	.607	-1.834	.066.
Trial Order	.032	.016	1.958	.050.
Verb frequency	-.403	.270	-1.492	.135
Verb length	.074	.361	.206	.837
Verb type (lexical reflexive)	3.357	.958	3.503	.000***
Verb type (true reflexive)	2.055	.772	2.661	.007**

Table 1. GLMER analysis on the sample of 3-year-old children

The second GLMER model (age 4) suggests that both lexical reflexive verbs (β=4.463; z=2.809; Pr(>|z|)=.004**) and true reflexive verbs (β=2.703; z=2.269; Pr(>|z|)=.023*) were produced more accurately than anti-causatives (Table 2).

Random effects	*Variance*	*SD*
Subject : Intercept	.734	.856
Stimuli :Intercept	1.091	1.044

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept	.316	.917	.344	.730
Trial Order	.004	.021	.189	.850
Verb frequency	.163	.444	.368	.712
Verb length	.465	.568	.818	.413
Verb type (lexical reflexive)	4.463	1.588	2.809	.004**
Verb type (true reflexive)	2.703	1.191	2.269	.023*

Table 2. GLMER analysis on the sample of 4-year-old children

The last GLMER analysis (age 5) presented in Table 3 supports the results of the previous two GLMER analyses when it comes to the comparison between lexical reflexive and anti-causative verbs (β=-2.984; z=-2.020; Pr(>|z|)=.043*), although the difference between the production of true reflexive and anti-causative verbs was not significant at this age (β=.802; z=.827; Pr(>|z|)=.408).

Random effects	*Variance*	*SD*
Subject : Intercept	4.852e-08	.000
Stimuli :Intercept	5.574e-01	.746

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept	1.587	.776	2.044	.041*
Trial Order	.010	.022	.463	.643
Verb frequency	.173	.394	.441	.659
Verb length	-.269	.467	-.576	.565
Verb type (lexical reflexive)	2.984	1.477	2.020	.043*
Verb type (true reflexive)	.802	.970	.827	.408

Table 3. GLMER analysis on the sample of 5-year-old children

The results from the first two groups indicate that children have more difficulty producing anti-causative than true or lexical reflexive verbs. In the oldest tested group the difference beween the production of true reflexive and anti-causative verbs was not significant, whereas the difference between the production of lexical reflexive and anti-causative verbs was still significant. The effect of verb length and frequency was not found.

4.2 Overall verb production across groups

GLMER analyses of true reflexive, lexical reflexive and anti-causative verb production in different age groups have already shown that anti-causative verbs were the most problematic verb type tested. Every child could produce 6 target verbs of each verb type, which means that the maximum number of target answers per verb type was 120 in every age group. In figure 2, we can see that the participants had no difficulty producing true (94/120) or lexical reflexive verbs (105/120) from the earliest age. Unlike the production of reflexive verbs, the production of target anti-causative answers did not even reach 50% in the youngest tested group (49/120). Figure 2 also shows that the production of anti-causative verbs increased steadily in Group 2 (78/120) and Group 3 (92/120). On the other hand, the production of true reflexive verbs was above 90% in both Group 2 (109/120) and Group 3 (110/120), and the production of lexical reflexive verbs reached almost 100% in both Group 2 (117/120) and Group 3 (119/120). The data indicate that the developmental pattern of the acquisition of the tested *se*-verbs in Serbian starts with lexical reflexive verbs, followed by true reflexive verbs, whereas the acquisition of anti-causative *se*-verbs is delayed.

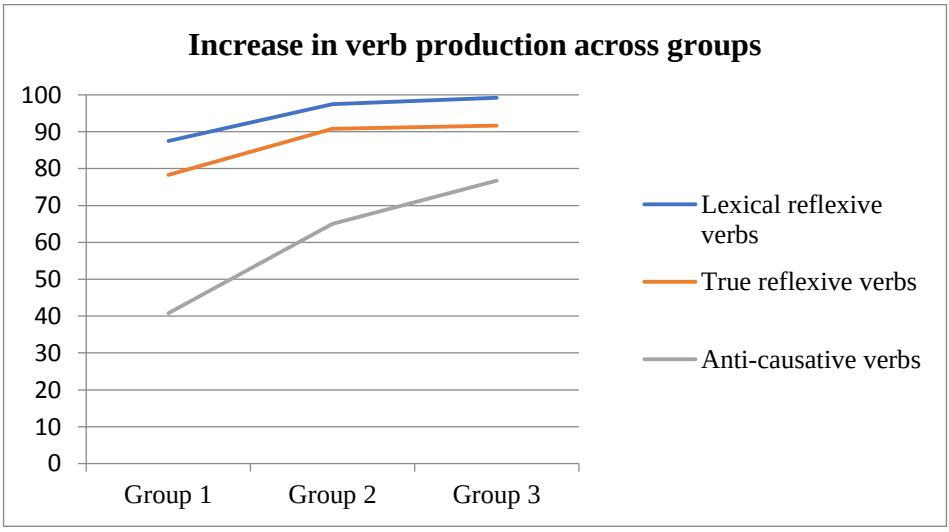


Figure 2. Increase in verb production across groups in percentages

Individual analyses of target anti-causative answers reveal some variation in Group 1. The results were around 50% for more than half of the tested children. The exceptions to this were three children who did not produce any anti-casative

verbs, three children who produced only one target answer and three children who produced 5 out of 6 anti-causatives. There were no children who produced all the target verbs in this group. In Group 2, the children produced three to five correct answers in 85% of the cases. There were no children who produced none or all the target verbs. In Group 3, the children produced four or more correct answers in 85% of the cases. The minimum number of target answers produced per child in the oldest tested group was three. The least accurate production of anti-causative verbs yielded numerous non-target answers. All non-target answers will be presented and analyzed in the next section.

4.3 Non-target answers

4.3.1 True-reflexive verbs

When it comes to non-target answers for true reflexive verbs, there were 26 non-target answers in Group 1, 11 non-target answers in Group 2 and 10 non-target answers in Group 3, as presented in Table 4. Alternative answers in all the three groups most often included verbs with complements instead of their variants with the clitic *se* (e.g. *briše lice* 'she is wiping her face' instead of *briše se*). The number of answers belonging to this category was the highest in Group 1 (12/26), forming 10% of all the children's answers for true reflexive verbs (12/120). Moreover, children who produced non-target verbs (3/26) in the youngest group chose constructions with complements (*ona briše svoje lice sa ovim* 'she is wiping her face with this'), or even adverbs (*ovako trljaš* 'you are rubbing like this'), accompanied by gestures in order to describe the given situation. There were two instances of target verbs used without the clitic *se*, one example of a noun used instead of the target verb, and one example of the clitic *se* with the adverb *ovako* 'like this', accompanied by a gesture and categorised as other. There were seven occasions when children did not produce an answer.

As far as alternative answers in Group 2 are concerned, the situation was similar, although the number of non-target answers decreased (11). Examples of using verbs with complements instead of *se*-verbs were still numerous (9/11), forming 8% of all the children's answers for true reflexive verbs (9/120). However, there was only one non-target verb and once there was no answer. Alternative answers in Group 3 were very similar to those in Group 2. There were almost as many examples of using verbs with complements as in the previous group (8/10). An important difference is that the two non-target verbs that were used included the clitic *se*, therefore being equally syntactically complex as the target verbs, just

not pragmatically appropriate for the described situations. All the answers are given in Appendix 4.

Category	Group 1/ No. per group	Group 2/ No. per group	Group 3/ No. per group
Non-target verbs	3	1	2
Example	*ona briše svoje lice* she.NOM wipe.3SG.PRES her face.ACC 'she is wiping her face' instead of 'put on make-up'	*trlja* rub.3SG.PRES 'he is rubbing' instead of 'wash one's face'	*pere se* wash.3SG.PRES SE 'he is washing himself' instead of 'wash one's face'
Verbs with full complements	12	9	8
Example	*kosu četka* hair.ACC brush.3SG.PRES 'she is brushing her hair'	*oblači majicu* put on.3SG.PRES T-shirt.ACC 'he is putting on a T-shirt'	*šminka usta* make-up.3SG.PRES lips.ACC 'she is putting on lipstick'
Target verbs without the clitic *se* Example	2 *maže* paint.3SG.PRES	/	/
Nouns Example	1 *tu majicu* that T-shirt.ACC 'that T-shirt' instead of 'dress oneself'	/	/
Other Example	1 *on se ovako* he.NOM SE like this 'he himself like this' instead of 'wash one's face'	/	/
No answer	7	1	/
Total number of non target answers:	26	11	10

Table 4. Non-target answers for true reflexive verbs across groups

The number of non-target answers with complements points to these children's preference towards transitive variants of the verbs. It also explains the somewhat lower production of true reflexive verbs in comparison with lexical reflexive verbs, which did not have the possibility of transitive paraphrases in the experimental context.

4.3.2 Lexical reflexive verbs

As can be seen in Table 5, the number of non-target answers for lexical reflexive verbs was smaller than the number of non-target answers for true reflexive verbs (19 versus 47 in all the groups). There were 15 non-target answers in Group 1, 3 non-target answers in Group 2 and 1 non-target answer in Group 3. There were only four categories of non-target answers present: non-target verbs, verbs without the clitic *se,* other and no answer. The answers belonging to the category of non-target verbs were the most numerous (9/19). There were six non-target verbs in Group 1, two in Group 2, and only one non-target verb in Group 3. What can be seen from the children's answers is that they used syntactically simple structures (including mostly transitive and unergative verbs). In some cases the participants from the youngest group misinterpreted the presented situation (e.g. *nosi drvo* 'he is carrying the tree' instead of 'he is climbing'), most likely due to their very young age. There were only two instances of verbs used without the clitic *se* in Group 1 and one in Group 2. There were three answers categorised as other (all produced in the youngest group), in which the children used copular constructions with adjectives, instead of the verb *smejati se* 'laugh'. The children did not produce an answer four times, all in the youngest tested group. All the answers are provided in Appendix 5.

Category	Group 1/ No. per group	Group 2/ No. per group	Group 3/ No. per group
Non-target verbs	6	2	1
Example	*ne plače* not cry.3SG.PRES 'he is not crying' instead of 'laugh'	*igra balet* dance.3SG.PRES ballet.ACC 'she is dancing ballet' instead of 'turn around'	*pleše* dance.3SG.PRES 'she is dancing' instead of 'turn around'
Target verbs without the clitic *se*	2	1	/
Example	*igra* play.3SG.PRES (2x)	*vrti* turn around.3SG.PRES	

Other Example	3 *srećan je* happy.MASC is 'he is happy' instead of 'laugh' (2x)	/	/
No answer	4	/	/
Total number of non-target answers	15	3	1

Table 5. Non-target answers for lexical reflexive verbs across group

4.3.3 Anti-causative verbs

Non-target answers were most numerous for this group of tested *se*-verbs. As can be seen in Table 6, there were 71 non-target answers in Group 1, 42 non-target answers in Group 2 and 28 non-target answers in Group 3, which makes a total of 141 non-target answers, in comparison with 19 non-target answers for lexical reflexive verbs and 47 non-target answers for true reflexive verbs. Different answers were present in all the seven categories (non-target verbs, verbs with implicit agents, verbs without the clitic *se*, made-up verbs, nouns, other and no answer). All the answers are given in Appendix 6.

Non-target verbs were most numerous in Group 1 (43/71), and they represent 36% of all the children's answers for anti-causative verbs (43/120). In this group, non-target verbs were produced for every tested verb. 40% of the verbs that were used instead of the target ones involved the presence of an agent (e.g. *deca su izašla* 'the children went out' instead of 'the door closed'), which is not present in the structure of anti-causative verbs. This was especially the case with the verb *ugasiti se* 'go out'. The children would not focus on the presented activity, but rather come up with agents who caused the candle to go out (e.g. *duvaju deca* 'the children are blowing'). What needs to be pointed out is that some children tried to make the verb *oduvati* 'blow out' anti-causative (*oduvalo se* 'it blew SE'), which is impossible in Serbian, because this verb requires the presence of an agent. 35% of non-target verbs were unaccusative, and in half of those answers the children preferred focusing on the quality of themes (e.g. *sija* 'glow.3SG.PRES'), even though they were asked explicitly to focus on the result of the presented activity (the question they were asked was always "What happened?"). From the answers for the target verb *pokvariti se* 'break', we can see that children are also prone to give inanimate objects human-like qualities (*pao i udario se* 'he fell and hit himself' instead of 'the robot broke') and that might have prevented them from

giving the target answer in some cases. In 26% of non-target verbs, the children used a different anti-causative verb, semantically inappropriate for the given situation (e.g. *pokidala se* 'rip.3SG.FEM SE' instead of *polomila se* 'break').

Category	Group 1/ No. per group	Group 2/ No. per group	Group 3/ No. per group
Non-target verbs	43	22	17
Example	*deca su izašla i bilo je lupanje* children.NOM go out.3PL.PAST and was bang.NOM 'the children left and there was a bang' instead of 'close'	*ovde se oduvala* (2x) here SE blow out.3SG.PAST.FEM 'here it blew out' instead of 'go out'	*poludi* go crazy.3SG.PRES 'he goes crazy' instead of 'break'
Verbs with implicit agents	6	1	1
Example	*polomili su dečaci* break.3PL.PAST boys.NOM 'the boys broke'	*to je otvorio auto kapiju* that open.3SG.PAST.MASC car.NOM gate.ACC 'the car opened the gate'	*onda su bili zaključani* then lock.3PL.PAST.PASS 'then they were locked'
Target verbs without the clitic Example	4 *upalilo* 'turn on.3SG.NEUT'	1 *palo i razbilo* 'fall.3SG.NEUT and break.3SG.MASC'	1 *otvarala* 'open.3SG.PAST.FEM'
Made-up verbs Example	1 *plujava* instead of *polomila se* 'break'	1 *se ispalila* instead of *se ugasila* 'go out'	/
Nouns Example	2 *sunce* 'sun.NOM' instead of 'turn on'	1 *jutro* 'morning.NOM' instead of 'turn on'	/
Other Example	11 *otvorena* open.FEM.ADJ 'opened'	15 *je izduvana* is blown.FEM.ADJ 'is blown'	9 *se polomljena* SE broken.FEM.ADJ 'se broken'
No answer	4	1	/
Total number of non target answers:	71	42	28

Table 6. Non-target answers for anti-causative verbs across groups

The answers in the category other, in which they also answered referring to the state rather than result (e.g. *pokvareno je oko* 'the eye is broken' instead of 'the robot broke'), were numerous as well (11/71), forming 9% of all the children's answers for anti-causative verbs. Non-target answers belonging to other categories were not so numerous: there were 6 verbs used with implicit agents, 4 verbs used without the clitic *se*, 1 made-up verb, 2 nouns and 4 times there was no answer.

The number of non-target answers slowly decreased across groups. In Group 2, there were 22 non-target verbs (18% of all the answers for anti-causative verbs), 15 answers categorized as other (13% of all the answers for anti-causative verbs), and one example per each of the remaining categories. An example of a made-up verb from this group is especially interesting, because it shows how children are ready to experiment with the verbs they know in the constructions they have not heard before (*se ispalila* instead of 'the candle went out'). The child added the prefix *is-* to the verb stem (as opposed to the prefix *u-* in *upaliti se* which means 'to light up'), by analogy with some other verbs that take that prefix (e.g. *isključiti* 'turn off' as opposed to *uključiti* 'turn on'). In Group 3, there were 17 non-target verbs (14% of all the answers for anti-causative verbs), 9 answers categorized as other (8% of all the answers for anti-causative verbs), one verb with an implicit agent and one verb used without the clitic *se*.

The syntactic variety of non-target answers implies that children are capable of producing anti-causative verbs, even at an early age. However, they have a tendency to use implicit agents, which is clear from the number of agentive non-target answers in Group 1, which decreased with age (23 in Group 1 vs. 8 in Group 2 vs. 6 in Group 3, see Appendix 6). They also seem to make mistakes with placing verbs into fixed or alternating transitivity categories.

5. Discussion and conclusion

The aim of the present research study was to test the production of true reflexive, lexical reflexive and anti-causative verbs at different stages of language acquisition, in order to gain some insight into the way children acquire *se*-verbs of different syntactic complexity. Some important developmental changes were noted. Based on the data obtained in different age groups, the developmental pattern of Serbian *se*-verbs would be: lexical reflexive > true reflexive > anti-causative verbs. The initial hypothesis that the children would have most difficulty producing anti-causative verbs due to their syntactic and semantic complexity was confirmed, since the results show the least accurate production of anti-causative verbs across groups. As opposed to the results obtained for the acquisition of true and quasi

reflexive verbs in Croatian as L2 (Pavlinušić & Kelić, 2011), the results of the present study show that lexical reflexive verbs were produced most accurately, although the production of true reflexive verbs was also quite high in all the tested groups.

One of the major findings of this study is that children do not seem to have problem producing reflexive (either true or lexical) verbs even at an early age. The results support the findings from previous studies in favour of the Continuity Hypothesis (Snyder, Hyams & Crisma 1995; Lorusso, Caprin & Guasti 2005; Costa & Friedmann 2012), which proposes that children are sensitive to syntactic differences from the earliest age. The children produced anti-causative verbs less accurately at all the tested ages, as the Maturation hypothesis (Borer & Wexler 1987; Babyonyshev et al. 2001) would predict, due to the children's inability to perform A-chains. However, alternative answers for target anti-causative verbs presented in Table 6 show that some of the children produced different anti-causative verbs, or tried to make ones from the verbs which imply the presence of an agent (*oduvala se* 'it blew'). These findings suggest that children were capable of performing A-movement, even at an early age, which speaks against the Maturation hypothesis. Therefore, I believe that the lower production of anti-causative verbs should not be attributed to the problem with A-chains (as would be assumed under the Maturation Hypothesis), but rather to the process of detransitivisation and deletion of +cause theta role. However, the results of the present study are not informative enough to completely reject the Maturation hypothesis at this point, since the youngest tested age was 31 months and the relatively "old" age of the participants might account for their ability to peform A-movement. Further data from younger participants is needed in order to confirm these results.

The reason why the children made a mistake trying to make the verb *oduvati* 'blow out' anti-causative is that they were not able to assign this verb to an appropriate narrow semantic category. This finding provides support for Pinker's hypothesis on narrow semantic constraints, which was confirmed in the experiment conducted by Brooks and Tomasello (1999). The results also show that children are likely to overgeneralise implicit agents, as previous studies have suggested (Roeper 1987; Bowerman 1991; Verrips 2000; Ilić Matijević 2017).

Regarding the limitations of the research, the frequencies of the target verbs in child language could not be explored in detail, because there are only eight available transcripts of Serbian-speaking children in the CHILDES database (Anđelković, Ševa & Moskovljević 2001), which is a small number if one is to

look into specific verb types, as was the case in this study. For that reason, the frequency of the verbs was taken from Serbian Web Corpus (SrWaC).

When it comes to the limitations of the stimuli, experiments with children are sensitive to inference based on 'knowledge of the world' (Verrips 2000). This real-world bias may be the reason why children insisted on implicit agents with certain target anti-causative verbs, such as *ugasiti se* 'go out', even at an older age. It might be the case that children chose to focus on what would happen in the real world, regardless of the exact representation in the stimulus. Moreover, some of the events presented in the stimuli could have also been presented in video clips. However, making video clips would be much more costly and time-consuming. Also, it would be hard to make videos which would hold children's attention without adding more details. Since we wanted to make it as easy as possible for children to focus on the intended event, we opted for drawings instead of video clips.

Finally, since only longitudinal studies allow a reliable insight into the individual development of children, our intention is to repeat the experiment longitudinally after a year, in order to obtain a more complete understanding of the development of reflexive and anti-causative *se*-verbs in Serbian and see if the developmental pattern shown in this study will be kept.

References

Anđelković, D., Ševa, N. & Moskovljević, J. (2001). *Srpski elektronski korpus ranog dečijeg govora.* Beograd, Srbija: Laboratorija za eskperimentalnu psihologiju, Filozofski fakultet u Beogradu; Katedra za opštu lingvistiku, Filološki fakultet u Beogradu.

Babyonyshev, M., Fein, R., Ganger, J., Pesetsky, D. & Wexler, K. (2001). The maturation of grammatical principles: Evidence from Russian unaccusatives. *Linguistic Inquiry, 32*(1), 1-44.

Barić, E. et al. (1997). *Hrvatska gramatika*. Zagreb: Školska knjiga.

Borer, H. & Wexler, K. (1987). The maturation of syntax. In T. Roeper & E. Williams (Eds.), *Parameter Setting* (pp. 23-172). Dordrecht: Reidel.

Bowerman, M. (1991). When a patient is the subject: sorting out passives, anti-causatives, and middles in the acquisition of English. Paper presented at the *Symposium on Voice*, University of California, Santa Barbara, CA.

Brooks, P. & Tomasello, M. (1999). How children constrain their argument structure constructions. *Language*, *75*, 720-738.

Costa, J. & Friedmann, N. (2012). Children acquire unaccusatives and A-movement very early. In M. Everaert, M. Marelj & T. Siloni (Eds.), *The theta system: Argument structure at the interface*. Oxford Studies in Theoretical Linguistics 37 (pp. 354-378). Oxford, UK: Oxford University Press.

Eisenbeiss, S. (2010). Using production methods in language acquisition research. In E. Blom & S. Unsworth (Eds.), *Experimental methods in language acquistion research* (pp. 11-34). Amsterdam / Philadelphia: Benjamins.

Grubišić, V. (2007). *Croatian Grammar*. Toronto: Hrvatske iseljenicke škole Amerike i Kanade.

Ilić Matijević, N. (2017). Unaccusative, transitive and anti-causative verb production in the process of language acquisition. In S. Halupka-Rešetar & S. Martínez-Ferreiro (Eds.), *Studies in Language and Mind 2* (pp. 79-128). Novi Sad: Filozofski fakultet u Novom Sadu.

Lorusso, P., Caprin, C. & Guasti, M. T. (2005). Overt subject distribution in early Italian children. In A. Brugos, M. R. Clark-Cotton & S. Ha (Eds.), *BUCLD29: A Supplement to the Proceedings of the 29th Boston University Conference on Language Development*. Boston: BUCLD. Available at http://www.bu.edu/linguistics/ APPLIED/BUCLD

Marelj, M. (2004). *Middles and argument structure across languages*. Utrecht: LOT.

Miličević, M. (2015). Između neakuzativnosti i neergativnosti: Povratno, uzajamno-povratno i autokauzativno se. In B. Arsenijević & S. Halupka-Rešetar (Eds.), *Srpski jezik u savremenoj lingvističkoj teoriji* (pp. 175-192). Niš: Filozofski fakultet.

Pavlinušić, E. & Kelić, M. (2011). Utjecaj poucavanja na ovladanost povratnim glagolima u hrvatskome kao inome jeziku. *LAHOR, 11*, 5-22.

Pinker, S. (1984). *Language learnability and language development*. Cambridge, MA: Harvard University Press.

Pinker, S. (1989). *Learnability and Cognition: The Acquisition of Argument Structure*. Cambridge, MA: MIT Press.

Reinhart, T. & Siloni, T. (2003). Thematic Arity Operations and Parametric Variations, *OTS working papers in linguistics, TL-03-001,* University of Utrecht.

Reinhart, T. & Siloni, T. (2005). The lexicon–syntax parameter: reflexivization and other arity operations, *Linguistic Inquiry, 36*(3), 389-436.

Roeper, T. (1987). Implicit arguments and the head-complement relation. *Linguistic Inquiry*, *18*, 267-310.

Samardžić, T. (2006). Reč se u argumentskoj strukturi ditranzitivnih glagola. *Naučni sastanak slavista u Vukove dane, 35*(1), 179-193.

Snyder, W., Hyams, N. & Crisma, P. (1995). Romance Auxiliary Selection with Reflexive Clitics: Evidence of early knowledge of Unaccusativity. In E. V. Clark (Ed.), *Proceedings of Child Language Research Forum 26* (pp. 127-136). Stanford CSLI.

Snyder, W. & Hyams, N. (2008). Children's passives: The role of discourse features. *UConn Psycholinguistics Brownbag*, 6 September 2008.

Stanojčič, Ž. & Popović, Lj. (2002). *Gramatika srpskog jezika.* Beograd: Zavod za udžbenike i nastavna sredstva.

Verrips, M. (2000). Passives and implicit arguments in child language. In S. C. Howell, S. A. Fish & T. Keith-Lucas (Eds.), *Proceedings of the 24th Annual Boston University Conference on Language Development* (pp.749-760). Somerville, MA: Cascadilla Press.

APPENDICES

Appendix 1: Parental consent form (translated from Serbian)

Parental Consent for Participation of a Child in a Research Study: Reflexive and anti-causative verb production at different stages of language acquisition

Introduction

The purpose of this form is to provide you information that may affect your decision as to whether or not to let your child participate in this research study. The person performing the research will describe the study to you and answer all your questions.

Purpose of the study

If you give your consent, your child will take part in a research study on the production of reflexive and anti-causative verbs. The purpose of the research study is to investigate the order in which children acquire *se*-verbs with different argument structure (true reflexive, lexical reflexive and anti-causative verbs). Because of this, the research study will be conducted with different age groups (ranging between 3 and 5 years). This research study is significant so as to confirm earlier findings in language acquisition. It should also provide novel data in this field.

What is my child going to be asked to do?

If you agree to let your child participate in the research study, he/she will be asked to have a look at a few drawings representing different situations. After every drawing, the researcher will, in the form of an interview, ask the child a question that will be closely related to the presented material (What is the boy doing here? What happened to the candle?). Visual material (drawings) will be used for depicting actions, and the children will be asked to name the situations presented on them (e.g. the boy is getting dressed, the girl is swinging, the candle went out).

Our intention is to conduct the research study with 60 children belonging to three age groups (approximately 3,4 and 5 years old). The interviews with the children will be audio recorded by the tape recorder, so that the data could be subsequently analysed. The children will not be photographed, nor video recorded. Also, our plan is to meet the children prior to the beginning of research.

Does my child have to participate?

Your child's participation in the research study is completely voluntary. Your child may decline to participate or withdraw from participation at any time.

Your child will not face any consequences, if you refuse to allow your child to participate in the research study.

Can anything harmful happen to my child during the interview?

There are no foreseeable risks to participating in this study. If your child does not feel comfortable at any moment, the interview will be stopped.

How will your child's privacy and confidentiality be protected if s/he participates in this research study?

Your child's privacy will be protected by not revealing their real name or surname, or any other data related to your child. The data that are collected in this study will be used for scientific purposes exclusively. The audio recordings will be kept private and they will be available only to the researchers.

Whom to contact with questions about the study?

Prior, during or after the participation of your child in the research you can contact the researcher **[Nina Ilić]** at **[069/1925869]** or send an email to **[nina.ilic.ns@gmail.com]** for any questions. This study has been reviewed and approved by the Ethics Committee at the Faculty of Philosophy, University of Novi Sad.

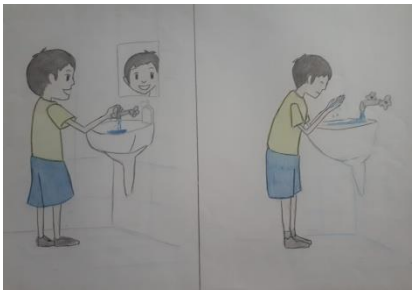
Signature

With your signature, you acknowledge that you have read and understood everything aforementioned. You have decided to give permission for your child's participation in the research study and the tape recording of the interview. You are making a decision about allowing your child to participate in this study. If you later decide that you wish to withdraw your permission for your child to participate in the study you may discontinue his or her participation at any time.

Appendix 2: Visual stimuli – drawings

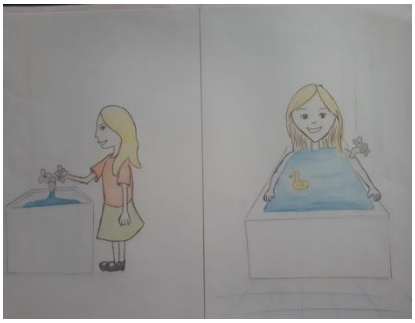
oblačiti se 'dress oneself'

umivati se 'wash one's face'



brisati se 'wipe oneself'

kupati se 'wash oneself'

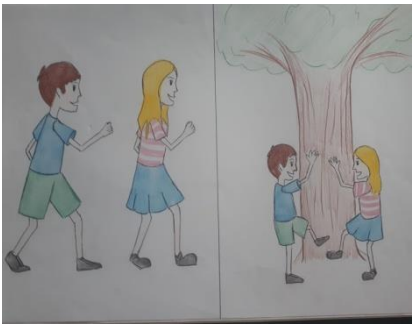


češljati se 'comb one's hair'

šminkati se 'put on make-up'

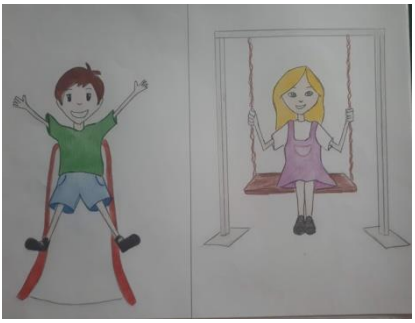
igrati se ‘play’

penjati se ‘climb’

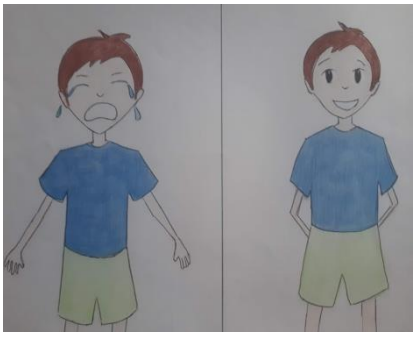


vrteti se ‘turn around’

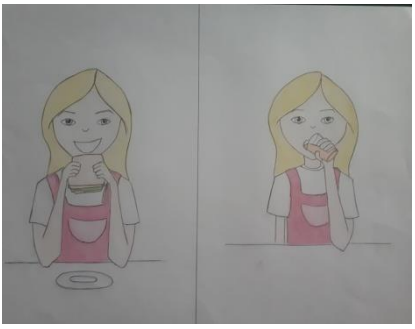
spuštati se ‘slide’; *ljuljati se* ‘swing’



smejati se ‘laugh’

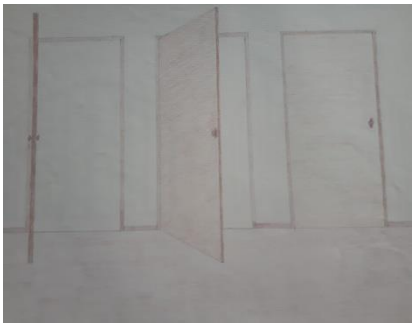


piti ‘drink’

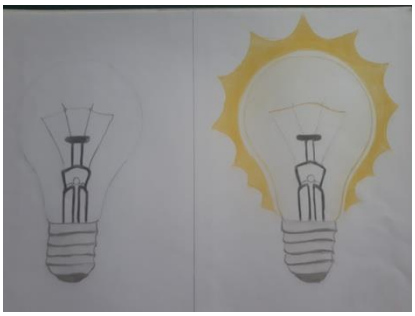


otvoriti se ‘open’

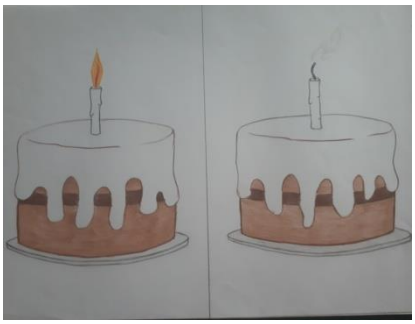
zatvoriti se ‘close’



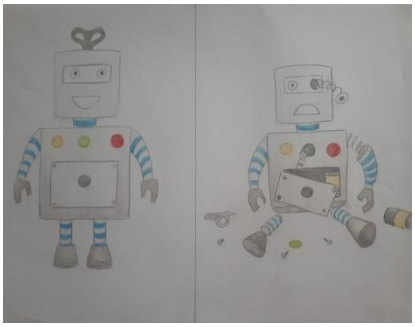
upaliti se ‘turn on’



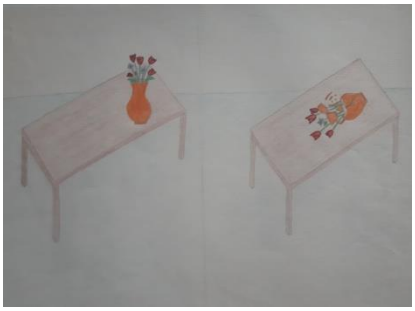
ugasiti se ‘go out’



pokvariti se ‘break’



polomiti se ‘break



Appendix 3: Sample interview

Interviewer: *Imam ovde neke crteže pa ću da ti ih pokažem, važi? A ti da mi pomogneš, da mi kažeš šta oni rade na tim crtežima. Može? Ona ovde ima sendvič, šta radi?*

I have some drawings here, so I'm going to show them to you, okay? And you can help me; tell me what they are doing in those drawings. Okay? She has a sandwich here, what is she doing?

Child: *Jede sendvič.*

eat.3SG.PRES sandwich.ACC

'She is eating a sandwich.'

Interviewer: *A ovde?*

And here?

Child: *Pije.*

drink.3SG.PRES

'She is drinking.'

Interviewer: *Tako je. Ovde? Šta se desilo sa kapijom ovde? Kapija?*

That's right. Here? What happened to the gate here? The gate…?

Child: *Kapija se tu otvorila.*

gate.NOM SE here open.3SG.FEM

'The gate opened there.'

Interviewer: *Tako je. Ovde, šta se desilo sa vratima?*

That's right. And what happened to the door here?

Child: *Tu se zatvorila.*

here SE close.3SG.FEM

'It closed there.'

Interviewer: *Tu su se zatvorila. Šta se desilo sa svetlom? Ovde je bilo ugašeno, i onda?*

It closed there. What happened to the light? It was turned off and then?

Child: *Proradilo je.*

work again.3SG.NEUT.PAST

'It started working.'

Interviewer: *Proradilo je, ili?*

It started working, or?

Child: *Se uključilo.*

se turn on.3SG.NEUT

'It turned on.'

Interviewer: *Se uključilo, dobro. Ovde svećica gori, a šta se ovde desilo? Svećica?*
It turned on, right. The candle is burning here, and what happened here? The candle?
Child: *Svećica je počela, izgorela je.*
candle.NOM start.3SG.PAST burn.3SG.PAST
'The candle started, it burnt.'
Interviewer: *Izgorela je? Dobro. Šta se desilo sa robotom?*
Burnt? Okay. What happened to the robot?
Child: *Ovaj robot se pokvario.*
this robot.NOM SE break.3SG.MASC'
'This robot broke.'
Interviewer: *Šta se desilo sa ovom vazom?*
What happened to the vase?
Child: *Ova vaza se polomila*.
this vase.NOM SE break.3SG.FEM
'This vase broke.'
Interviewer: *Tako je. Ovde se dečak skida, a ovde?*
Right. The boy is taking his clothes off here, and what about this?
Child: *Tu se obukao*.
'here SE dress.3SG.PAST'
'He got dressed.'
Interviewer: *Tako je.Ovde pušta vodu, a šta radi ovde?*
That's right. Here he is starting the water, and what is he doing here?
Child: *Umije se.*
wash face.3SG.PRES SE
'He is washing his face.'
Interviewer: *Tako je. Ovde ona pije kafu, a šta radi ovde?*
Right. She is having coffee here, and here?
Child: *Briše se.*
wipe.3SG.PRES SE
'She is wiping herself.'
Interviewer: *Tako je. Ovde devojčica pušta vodu, a šta radi ovde?*
That's right. The girl is starting the water here, and what is she doing here?
Child: *Kupa se.*
wash.3SG.PRES SE
'Having a shower.'
Interviewer: *Tako je. Ovde se ogleda, a ovde?*

Right. Here she is looking at herself in the mirror, and here?

Child: *Češlja.*

comb.3SG.PRES

'Combing her hair.'

Interviewer: *Ovde se mama isto ogleda, šta radi ovde?*

Here Mum is also looking at herself in the mirror, and here?

Child: *Šminka.*

make-up.3SG.PRES

'Putting on make-up.'

Interviewer: *Mama? Celu rečenicu mi samo reci. Mama?*

Mum? Tell me the whole sentence. Mum?

Child: *Mama.*

mum.NOM

'Mum.'

Interviewer: *Celu rečenicu. Mama?*

The whole sentence. Mum?

Child: *Mama se šminka.*

mum.NOM SE put on make-up.3SG.PRES

'Mum is putting on make-up.'

Interviewer: *Ovde ona crta, a šta radi ovde?*

She is drawing here, and what about this?

Child: *Pa, ne znam.*

well not know.1SG.PRES

'Well, I don't know. '

Interviewer: *Ne znaš, pa to su igračke, šta radi?*

You don't know? Those are her toys, what is she doing?

Child: *Igra se.*

play.3SG.PRES SE

'She is playing.'

Interviewer: *Pa da. Ovde oni trče, a šta radi dečak ovde?*

Well yes. They are running here, and what is the boy doing here?

Child: *Penje se.*

climb.3SG.PRES SE

'He is climbing. '

Interviewer: *Ovde ona igra školicu, a ovde? U krug onako, šta radi?*

She is playing hopscotch here, and here? What is she doing, making circles?

Child: *Vrti se.*

spin.3SG.PRES SE
'She is spinning.'

Interviewer: *Tako je. Ovde on plače, a ovde? Šta radi?*
That's right. He is crying here, and here? What is he doing?

Child: *Srećan je.*
happy.MASC is
'He is happy.'

Interviewer: *I?*
And?

Child: *Nasmejao se.*
smile.3SG.PAST SE
'He smiled.'

Interviewer: *Nasmejao se, tako je. Ovde dečak, šta radi?*
He smiled, right. And the boy, what is he doing?

Child: *Spušta se*.
slide.3SG.PRES SE
'He is sliding.'

Interviewer: *A devojčica? Šta radi na ljuljašci*?
And the girl? What is she doing on the swing?

Child: *Ljulja se.*
swing.3SG.PRES SE
'She is swinging.'

Interviewer: *Bravo. Je l' bilo teško?*
Bravo. Was it hard?

Child: *Ne*.
No.

Appendix 4: Non-target answers for true reflexive verbs across groups

	Non-target answers	Group 1	Group 2	Group 3
Non-target verbs	*oblačiti se* 'dress oneself'	*ne se skida* not SE take off.3sg.pres 'not is getting undressed'		
	umivati se 'wash one's face'	*ovako trljaš* like this rub.2sg.pres 'you are rubbing like this'	*trlja* rub.3sg.pres 'he is rubbing'	*pere se* wash.3sg.pres SE 'he is washing himself'
	brisati se 'wipe oneself'			*se čisti* SE clean.3sg.pres 'she is cleaning herself'
	šminkati se 'put on make-up'	*ona briše svoje lice sa ovim* she.nom wipe.3sg.pres self face.acc with this.inst 'she is wiping her face with this'		
	Verbs with full complements	*umivam lice* wash.1sg.pres face.acc 'I am washing my face' *briše (svoja) usta* (2x) wipe.3sg.pres (self) mouth.acc 'she is wiping her mouth' *pere lice* (3x) wash.3sg.pres face.acc 'he is washing his face' *briše lice* wipe.3sg.pres face.acc 'she is wiping her face' *kosu četka* hair.acc brush.3sg.pres	*briše usta /lice* (3x) wipe.3sg.pres mouth/face.acc 'she is wiping her mouth/face' *češlja kosu* (2x) brush.3sg.pres hair.acc 'she is brushing her hair' *maže šminku/usne* (2x) paint.3sg.pres make-up/lips.acc 'she is putting on make-up/lipstick' *pere ruke*	*mama stavlja šminku* mum.nom put on.3sg.pres make-up.acc 'mum is putting on make-up' *opere ruke i lice* wash.3sg.pres hands.acc and face.acc 'he washes his hands and face' *češlja kosu* (2x) brush.3sg.pres hair.acc 'she is brushing her hair' *šminka usta* make-up.3sg.pres lips.acc 'she is putting on lipstick'

	‘she is brushing her hair’ *obrišemo ruke* wipe.1pl.pres ‘we wipe our hands’ *obuče majicu* put on.3sg.pres T-shirt.acc ‘he puts on a T-shirt’ *maže usta* paint.3sg.pres lips.acc ‘she is putting on lipstick’ *obukao odeću* put on.3sg.masc clothes ‘he put on clothes.acc’	wash.3sg.pres hands.acc ‘he is washing his hands’ *oblači majicu* put on.3sg.pres T-shirt.acc ‘he is putting on a T-shirt’	*oblači majicu* put on.3sg.pres T-shirt.acc ‘he is putting on a T-shirt’ *briše usta* (2x) ‘wipe.3sg.pres mouth.acc ‘she is wiping her mouth’
Verbs without the clitic *se*	*obucio* ‘dressed.3sg.masc’[1] *maže* ‘paint.3sg.pres’		
Nouns	*tu majicu* ‘that T-shirt.acc’ instead of ‘dress oneself’		
Other	*on se ovako* ‘he.nom SE like this’ instead of ‘wash one’s face’		
No answer	7	1	/

[1] This verb form is incorrect. The correct past verb form would be ob*l*ačio, not ob*u*cio.

Appendix 5: Non-target answers for lexical reflexive verbs across groups

	Non-target answers	Group 1	Group 2	Group 3
Non-target verbs	*igrati se* ‘play’	*ona se vozi* she SE drive.3sg.pres ‘she is driving’		
	penjati se ‘climb’	*nosi drvo* carry.3sg.pres tree.acc ‘he is carrying a tree’		
	vrteti se ‘turn around’	*pleše* dance.3sg.pres ‘she is dancing’ *pleše na prstima balet* ‘dance.3sg.pres on toes.loc ballet.acc’ ‘she is dancing ballet on her toes’ *igra* dance.3sg.pres ‘she is dancing’	*pleše* dance.3sg.pres ‘she is dancing’ *igra balet* dance.3sg.pres ballet.acc ‘she is dancing ballet’	*pleše* dance.3sg.pres ‘she is dancing’
	smejati se ‘laugh’	*ne plače* not cry.3sg.pres ‘he is not crying’		
Verbs without the clitic *se*		*igra* ‘play.3sg.pres (2x)’	*vrti* ‘spin.3sg.pres.3sg.pres’	
Other		*srećan je* happy.masc is ‘he is happy’ instead of ‘laugh’ (2x) *je dobar* is good.masc		

	‘he is good’ instead of ‘laugh’		
No answer	4	/	/

Appendix 6: Non-target answers for anti-causative verbs across groups

Non-target answers		Group 1	Group 2	Group 3
Non-target verbs	open ‘otvoriti se’	*ovde možeš da izađeš* here can.2sg.pres to get out.2sg.pres ‘you can get out here’ *(da) prođu tu kola (2x)* to pass.3pl.pres here car.nom ‘(that) the car passes here’ *ovde može ovaj auto da prođe* here can.3sg.pres this car.nom to pass.3sg.pres ‘here this car can pass’ *iščupalo se* pluck out.3sg.neut SE ‘it plucked out’		
	zatvoriti se ‘close’	*nema mesta* not have.3sg.pres space.gen ‘there is no space’ *tu piškimo i peremo ruke* here pee.1pl.pres and wash.1pl.pres hands.acc ‘we pee and wash our hands here’ *deca su izašla i bilo je lupanje* children go out.3pl.past and was bang.nom ‘the children.nom left and there was a bang’ *polomila se* break.3sg.fem SE ‘it broke’ *sudare se*	*ne mogu da se otvore* not can.3pl.pres to SE open.3pl.pres ‘they cannot be opened’	

	collide.3pl.pres SE 'they collide' *mora da ih otključa* must.3sg.pres to them unlock.3sg.pres 'he/she needs to unlock them'		
upaliti se 'turn on'	*ovde radi* here work.3sg.pres 'it works here' *sija (2x)* glow.3sg.pres 'it glows' *gacilo se* turn off.3sg.neut SE 'it turned off' *istrošila se baterija* expend.3sg.fem SE battery.nom 'the battery expended' *ugasio se* turn off.3sg.masc SE 'it turned off' *zagorelo je* burn.3sg.neut.past 'it burnt'	*svetli (4x)* shine.3sg.pres 'it shines' *sija (2x)* glow.3sg.pres 'it glows' *svetlo je radilo* light work.3sg.neut.past 'the light worked'	*sad radi* now work.3sg.pres 'it's working now' *proradilo* work.3sg.neut again 'it's working again' *svetli* shine.3sg.pres 'it shines' *je radi* is work.3sg.pres 'is work'
ugasiti se 'go out'	*duvali su je (2x)* blow.3pl.past it.acc 'they were blowing it' *prosula se* spill.3sg.fem SE 'it spilt' *dune se*	*ne gori (3x)* not burn.3sg.pres 'it is not burning' *ovde se oduvala (2x)* here SE blow.3sg.fem 'here it blew out' *dunula je*	*izduvala se* blow.3sg.fem SE 'it blew out' *izgorela* burnt.3sg.fem 'burnt' *nema više*

	blow.3sg.pres SE 'it is blown' *je dunula/duvao(2x)* blow.3sg.fem/masc.past 'he/she blew it' *ne gori* not burn.3sg.pres 'it is not burning' *duvaju deca* blow.3pl.pres children.nom 'the children are blowing' *izduvalo* blown.3sg.neut 'blown out' *ne puši* not smoke.3sg.pres 'it isn't smoking' *duva* blow.3sg.pres 'he/she is blowing' *oduvalo se* blow.3sg.neut SE 'it blew out'	blow.3sg.fem.past 'she blew it' *ne radi* not work.3sg.pres 'it is not working' *nije tu bila vatra* not be.3sg.past here was fire.nom 'there wasn't a fire here' *neko je oduvao* someone.nom blow.3sg.masc.past 'someone blew it' *oduvalo* blown.3sg.neut 'blown' *dunu* blow.3pl.pres 'they blow'	not have.3sg.pres more 'there is no more' *neko je oduvao (3x)* someone.nom blow.3sg.masc.past 'someone blew it' *oduvala se* blow.3sg.fem SE 'it blew out' *ne gori* not burn.3sg.pres 'it isn't burning' *je nema* she.gen not have.3sg.pres 'there isn't one' *isključila se* turn off.3sg.fem SE 'it turned off' *je izgorela* burn.3sg.fem.past 'it burnt'
pokvariti se 'break'	*nema oči* not have.3sg.pres eyes.acc 'it doesn't have eyes' *pao i udario se (2x)* fall.3sg.masc and hit.3sg.masc SE 'he fell and hit himself' *nestalo mu je struje*		*poludi* go crazy.3sg.pres 'he goes crazy'

	go out.3sg.neut.past he.dat electricity.gen 'his electricity went out'		
polomiti se 'break'	*palo (2x)* fell.3sg.neut 'fell' *prosula se (2x)* spill.3sg.fem SE 'it spilt' *pala je* fall.3sg.fem.past 'it fell' *srušilo* knocked off.3sg.neut.past 'knocked off' *pokvarila se (2x)* break.3sg.fem.past SE 'it broke' *pokidala se* 'rip.3sg.fem.past SE' 'it ripped'	*pukla je* crack.3sg.fem.past 'it cracked' *srušila* knocked off.3sg.fem.past 'knocked off' *vaza se pokvarila* vase.nom SE break.3sg.fem.past 'the vase broke'	*pala i puknula* fall.3sg.fem.past and crack.3sg.fem.past 'it fell and cracked'
Verbs with implicit agents	*polomio oko* break.3sg.masc.past eye.acc 'broke eye' *ot(v)ori(li) su* open.3pl.past 'they opened' *neko je ugasio tu svećicu* someone.nom blow.3sg.past that candle.acc 'someone blew that candle' *onda su tu stavili vrata i zatvorili*	*to je otvorio auto kapiju* that open.3g.past car.nom gate.acc 'the car opened the gate'	*onda su bili zaključani* then lock.3pl.past.pass 'then they were locked'

	then here put.3pl.past door.acc and close.3pl.past 'then they put the door there and closed' *polomili su dečaci* break.3pl.past boys.nom 'the boys broke' *neko ga je polomio* somone.nom him break.3sg.past 'someone broke him'		
Verbs without the clitic *se*	*razbio* 'break.3sg.masc.past' *vaza dole stoji i razbila* 'vase.nom down stand.3sg.pres and break.3sg.fem.past' *otvarala* 'open.3sg.fem.past' *upalilo* 'turn on.3sg.neut.past'	*palo i razbilo* 'fall.3sg.neut.past and break.3sg.masc.past'	*otvarala* 'open.3sg.fem.past'
Made-up verbs	*plujava* instead of *polomila se* 'break'	*se ispalila* instead of *se ugasila* 'turn off'	
Nouns	*sunce* 'sun.nom' instead of 'turn on' (2x)	*ovde jutro* 'here morning' instead of 'turn on'	
Other	*ova vrata se zaključana* this door.nom SE locked.fem.adj 'this door locked' *upaljeno je (2x)* turned on.neut.adj is 'it is turned on' *se zatvorena* SE closed.fem.adj 'closed' *je upaljeno*	*otvorena (2x)* open.fem.adj 'opened' *zatvorena (2x)* closed.fem.adj 'closed' *upaljeno je svetlo (2x)* turned on.neut.adj is light.nom 'the light is on'	*zaključana* locked.fem.adj 'locked' *su zaključana (2x)* are locked.fem.adj 'are locked' *su zatvorena (3x)* are closed.fem.adj 'are closed' *je ugašena*

	is turned on.neut.adj ‘is turned on’ *pokvareno je oko* broken.neut.adj is eye.nom ‘the eye is broken’ *svetlo upaljeno* light.nom turned on.neut.adj ‘the light on’ *(kapija) je otvorena (2x)* gate.nom is open.fem.adj ‘the gate is opened’ *jedna je zatvorena* one is closed.fem.adj ‘one is closed’ *otvorena* open.fem.adj ‘opened’	*vrata su zatvorena (2x)* door.nom are closed.fem.adj ‘the doors are closed’ *upaljena* turned on.fem.adj ‘turned on’ *je otvorena* is open.fem.adj ‘is opened’ *ova je skroz zatvorena* this.nom is completely closed ‘this one is completely closed.fem.adj’ *je izduvana* is blown.fem.adj ‘is blown out’ *upaljeno (2x)* turned on.neut.adj ‘turned on’ *je pokvaren* is broken.neut.adj ‘is broken’	is gone out.fem.adj ‘is gone out’ *se polomljena* SE broken.fem.adj ‘broken’ *je polomljena* is broken.fem.adj ‘is broken’

Part III: Acquired language disorders

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IS THERE A DEICTIC VS. ANAPHORIC PRONOUN DISSOCIATION IN AGRAMMATISM?

Abstract: *Background*: A characteristic feature of the acquired language disorder called agrammatism in analytic languages is that grammatical elements are often substituted or omitted. Pronouns have traditionally been regarded as grammatical *en bloc*, and therefore been assumed to be equally susceptible to substitution or omission in agrammatism. This assumption is unwarranted, however. Firstly, Ishkhanyan et al. (2017) argued that a distinction can be made between lexical and grammatical pronouns, and showed that the latter are more prone to omission in agrammatism than the former. Secondly, Avrutin (2000, 2006) argued that anaphoric pronouns are more severely affected in agrammatism if they depend on discourse for reference resolution than if reference can be resolved clause-internally.

Aim & Method: We investigate whether there is also a difference between deictic and anaphoric pronouns in agrammatism. Specifically, we hypothesize that anaphoric pronouns are more severely impaired than deictic ones, as in the case of the former reference resolution depends on memory, whereas in the case of the latter this is not (necessarily, at least) the case. For the purpose of testing this hypothesis, the production of deictic and anaphoric pronouns in semi-spontaneous speech (including autobiographic, descriptive and narrative tasks) in a Danish participant with agrammatism was analysed and compared with the production of such pronouns in semi-spontaneous speech in six non-brain-damaged subjects.

Results: The participant with agrammatism had a significantly lower anaphoric-deictic pronoun ratio than the controls. Both overall and in the individual tasks, she consistently produced more deictic than anaphoric pronouns, whereas the controls produced more

anaphoric than deictic pronouns in all but one task. The participant produced fewer anaphoric pronouns than the controls, but an amount of deictic pronouns comparable to the amount produced by the controls.
Discussion: The results confirm the hypothesis that anaphoric pronouns are more impaired than deictic ones in agrammatism. In fact, only anaphoric pronouns seem to be impaired. The results can be accounted for as reflecting that anaphoric pronouns depend on memory for reference resolution, while deictic pronouns do not, and that agrammatism involves memory impairment. However, the study can be considered a pilot study at best, as the data on which it is based are limited.

Key words: deixis, anaphora, agrammatism, discourse linking

1. Introduction

Agrammatism can be defined as follows:

> "a language disorder resulting from acquired brain damage, characterized by non-fluent speech with reduced speech rate and short grammatically impoverished sentences in which syntactic and morphological devices are limited. Word order difficulty, omission or substitution of bound and/or free-standing grammatical morphemes, and omission or nominalization of main verbs are common." (Thompson & Bastiaanse, 2012: 2)

Pronouns have traditionally been regarded grammatical *en bloc*, because they belong to closed classes and have a rather schematic meaning. They have therefore been assumed to be prone to substitution or omission in agrammatism. However, not all pronouns are equally effected in agrammatism. Firstly, Ishkhanyan et al. (2017) argued that a distinction can be made between lexical and grammatical pronouns, and in a study of pronoun production in French agrammatism they showed that the latter are more prone to omission than the former (cf. Stavrakaki & Kouvava 2003; Martínez-Ferreiro et al. 2017 on Spanish; Messerschmidt et al. 2018 on Danish). Secondly, Avrutin (2000, 2006) argued that anaphoric pronouns are more severely affected in agrammatism if reference must be resolved clause-externally, as in the case of non-reflexive object pronouns, than if it can be resolved clause-internally, as in the case of reflexives (see also e.g. Avrutin, Lubarsky & Greene 1999; Bos et al. 2014; Grodzinsky et al. 1993; Edwards & Varlokosta 2007).

The present paper investigates a third distinction that can be made within the class of pronouns: the distinction between deictic pronouns (such as *I* in the example below) and anaphoric pronouns (such as *he*).

(1) I need to get in touch with Peter, he is waiting for the budget.

This distinction is understood in accordance with Lyons (1977), who defines deixis as "the location and identification of persons, objects, events, processes and activities being talked about or referred to, in relation to the spatiotemporal context created and sustained by the act of utterance and the participation in it, typically, of a single speaker and at least one addressee" (Lyons 1977: 637). The reference of deictic expressions is thus determined by "the spatio-temporal zero-point (the here-and-now)" (Lyons 1977: 638). In contrast, the reference of an anaphoric expression depends on an element mentioned earlier in the preceding discourse (Lyons 1977: 660).

This understanding of the distinction entails a crucial difference in the processing of the two kinds of pronouns. In order to resolve the reference of an anaphoric pronoun, an element from the preceding discourse must be stored in memory. In other words, anaphoric pronouns, unlike deictic pronouns, depend on memory. This means that anaphoric pronouns may be harder to process than deictic ones, especially for people with agrammatism associated with damage to Broca's area, as Broca's area has been claimed to play a role in memory (see e.g. Ullman 2013, on procedural memory, and Rogalsky, Matchin & Hickok 2008, on working memory). Accordingly, we hypothesize that individuals with agrammatic aphasia have more problems producing anaphoric than deictic pronouns.

In order to test this hypothesis, we conducted a case study of one Danish agrammatic subject's use of deictic and anaphoric pronouns. The analysis consists in a comparison of the anaphoric-deictic pronoun ratio of the agrammatic subject with that of the control group. Our hypothesis entails that, in addition to producing fewer pronouns than the controls, the agrammatic person will produce a lower anaphoric-deictic pronoun ration than the controls.

The paper is structured in the following way: Section 2 surveys the research on pronouns in agrammatism relevant to the present study. Section 3 outlines the methodology. In section 4, we present our results, which are discussed in Section 5. Section 6 is a brief conclusion.

2. Previous research on pronouns in agrammatism

The research on pronouns in aphasia has concentrated on the contrast between clause-internally referring pronouns (i.e. reflexives) and clause-externally referring ones. Recently, a number of studies have dealt with a contrast between lexical and grammatical pronouns.

Much of the research on clause-internal vs. clause-external reference has been influenced by a model proposed by Avrutin (2000; 2006) according to which syntax *per se* is not impaired in agrammatism, but rather 'weakened', meaning that processing sentences depending on syntax is no longer the most economical way of processing (Avrutin 2006: 60). Based on Chomsky, Avrutin proposes that sentence processing involves what is termed "narrow syntax" (Avrutin 2006: 52). Narrow syntax is defined as: "a computational system that is isolated and encapsulated with respect to meaning; that is, that such a system conducts symbolic operations on lexical items, putting them together in some specific order that is allowed in a given language" (Avrutin 2006: 52). The information processed through narrow syntax has to be merged with the information of the linguistic discourse or the context which contains information like: "topic, focus, specificity and pronominal anaphora" (Avrutin 2006: 52). In Avrutin's model, the meaning of sentences is thus represented both at the level of narrow syntax and information structure. Avrutin claims that in agrammatic speakers the narrow syntax – since it is weakened – is no longer the cheapest way of processing information, and hence they rely more often on contextual information than their healthy counterparts. Therefore, for agrammatic subjects, deficits arise in those cases where narrow syntax and processing relying on the context are in competition (Avrutin 2006: 57):

(2) Jan zag zich.
'John saw himself.'

(3) Jan zag hem dansen.
'John saw him dance.'

The reflexive in (2) will only be processed by narrow syntax and cannot depend on an antecedent outside the sentence. Hence it does not provide difficulties for agrammatic subjects. The anaphor in (3) depends on discourse linking, i.e. its reference cannot be processed clause internally. Hence it provides problems for agrammatic speakers**:** "Because the syntactic dependency is the less

economical one for [the agrammatic] population they sometimes allow a semantic or discourse dependency between the matrix subject and the pronoun" (Avrutin 2006: 58).

However, the empirical research on clause-internally vs. clause-externally referring pronouns does not give as clear a picture. While some studies show a dissociation between clause-internally referring pronouns (reflexives) and clause-externally ("discourse-linked") referring ones (Grodzinsky et al. 1993; Piñango & Burkhardt 2005), other studies (Avrutin, Lubarsky & Greene 1999; Edward & Varlokosta 2007; Bos et al. 2014) do not show such a dissociation, but show either a deficit in both pronouns and reflexives or no deficit at all. Grodzinsky et al. (1993) carried out a yes/no judgement task, where 15 English-speaking subjects (including 8 agrammatic subjects) had to decide whether a picture fits a sentence or not. The experimenters presented the subjects with a picture that matched the grammatical reading of the sentences (for reflexives, a picture that matched intra-clausal co-reference, and for pronouns, a sentence that did not match intra-clausal co-reference) and a picture that depicted a mismatch with the grammatical reading. The agrammatic subjects performed at chance for the mismatch condition of the pronoun, i.e. they accepted sentences with a pronoun having intra-clausal reference. Reanalysis of the data by Bos et al. (2014: 22) showed, though, that the subjects had a yes-bias. When this is taken into consideration, the agrammatic speakers had an overall poor performance on the pronoun task compared to the reflexives. Interestingly, the task design used by Grodzinsky et al. (1993) was used by Edward and Varlokosta (2007), but did not yield the same result. Rather, it showed no dissociation between pronouns and reflexives. Bos et al. (2014) contrasted (among other things) clause-externally and clause-internally referring pronouns in agrammatic speech and speech produced by individuals diagnosed with fluent aphasia (Wernicke's). Only the fluent aphasic individuals had significantly worse performance on the clause-externally referring pronouns.

Three recent studies have argued that a certain distinction between lexical and grammatical pronouns is significant for the description of grammatically impaired speech. All three studies are based on the theory of the lexical vs. grammatical distinction in Boye and Harder (2012), which defines grammatical elements as elements that are conventionalized as discursively secondary (i.e. carriers of background information) and dependent on a host element. This definition entails that grammatical pronouns can be identified and distinguished from lexical ones by their lack of capacity for being focalized, addressed in subsequent discourse, and modified. Based on these diagnostics, Ishkhanyan et al.

(2017) distinguished grammatical French propositions (e.g. *je* 'first person singular nominative', *me* 'first person singular accusative') from lexical ones (e.g. *moi* 'first person singular accusative') and found that pronouns classified as grammatical were more severely impaired in agrammatic speech than pronouns classified as lexical. Martínez-Ferreiro et al. (2019) made a similar distinction for Spanish pronouns, and showed a tendency for pronouns classified as grammatical to be more impaired even in cases of mixed aphasias. Messerschmidt et al. (2018) made the distinction for Danish pronouns and like Ishkhanyan et al. (2017) found – in a study of one individual with aphasia – that pronouns classified as grammatical are more impaired in agrammatic speech than pronouns classified as lexical.

What all these studies have in common is that ultimately they assume (with e.g. Kolk 1995) that the patterns of language production observed in aphasia are due to a processing deficit. As pointed out by a reviewer, however, they remain vague as to the nature of the deficit. A study that contrasts the production of deictic and anaphoric pronouns in aphasia can reveal whether this deficit pertains to memory (for instance, working memory, as suggested by Caplan 2012).

3. Methodology

3.1 Participants and speech samples analysed

To test our hypothesis that anaphoric pronouns are more impaired than deictic ones in agrammatism, we consulted The Danish Aphasia Corpus (DAC, Martínez-Ferreiro & Boye 2018), which consists of semi-spontaneous speech samples elicited by three different tasks: 1) a personal interview including questions about the illness story and former occupation, 2) a picture description task (Cookie theft; BDAE: Goodglass & Kaplan 1983), and 3) narrative retelling (The Frog story, Mayer 1969).[1]

After the selection of the samples, we looked at the overall pronoun production and compared anaphoric-deictic pronoun ratios in the semi-spontaneous speech of 6 non-brain-damaged Danish speaking subjects (3 men and 3 women; 50-74 y.o.; mean age: 58 y.o.; SD: 9) with the ratios in the semi-spontaneous speech of one female Danish speaking agrammatic subject (JA). JA was 43 years old at the time of the interview and diagnosed with stroke-induced Broca's aphasia

[1] To make the data comparable to other existing crosslinguistic sources, the DAC adheres to the standard guidelines for administration of the Aphasia Bank protocol.

(WAB-AQ: 68.6; MLU: 5.23). The interview was done 8 years and 7 months post onset.

Only words without repetitions were counted. For JA, our speech sample consisted of altogether 565 words (interview: 185; picture description: 136; narrative: 276); for the control group, the mean sample size was 842.7 words (interview: 284; picture description: 269.8; narrative: 288.8).

3.2 Pronoun classification

First and second person pronouns (*jeg* 'I', *du* 'you') are clear cases of deictic pronouns, as they respectively refer to the speaker and the addressee accessible through the speech situation (Löbner 2013: 64). Other pronoun types were less straightforwardly classified. In particular, demonstratives are ambiguous between a deictic and an anaphoric reading (cf. Hansen & Heltoft 2011: 562), and may be hard to classify in context. A tricky example from the speech sample analysed is (4).

(4) jeg beskriver først det jeg ser umiddelbart
det er <en> sådan en meget stereotyp øh hverdagssituation
'I will first describe what I see initially
it is <a> kind of a very stereotypical uhh everyday situation'

In (4), it is not clear, whether the demonstrative (marked by underscore) in the second line refers deictically to the picture present in the context, or anaphorically to a previously mentioned referent (*det jeg ser umiddelbart* 'what I see initially'). Since demonstratives – when ambiguous in context – can always be read as deictic, we classified them as deictic pronouns. Only in cases where deictic reference is impossible or implausible, did we categorise them as anaphoric pronouns. Results will be presented both including and excluding ambiguous pronouns.

Also, the decision which words to include in the study was not in all cases straightforward. On the one hand, the Danish proform *der* 'there' is in the literature usually analysed as an adverb, and only sometimes as a pronoun. Since it is a relatively frequent proform and behaves just like the analysed pronouns, however, we included it in the study. Like demonstratives, *der* is often ambiguous in context between a deictic and an anaphoric reading. In other cases, it is found in a special *der er*-construction ('there is …'):

(5) Der er en <en> mand (…)
'there is a <a> man'

One might argue that in this construction, *der* is deictic. Alternatively, however it may be analysed as a non-referential part of a fixed expression (e.g. Hansen & Heltoft 2011: 1215). For these reasons, we deal with *der* as if it were a demonstrative pronoun, and also give results where *der* is excluded (cf. the discussion of demonstratives above).

We excluded the word *som*, which is sometimes analysed as a relative pronoun. The reason for this is that there are good arguments for analysing it as a subordinate conjunction (for instance, it readily co-occurs with genuine relative pronouns). We also excluded reflexive pronouns in order not to conflate the distinction we are after with the distinction between intra- and extra-clausal reference discussed by Avrutin and others. That is, we only included clause-externally referring pronouns.

In addition, we excluded pronouns with cataphoric reference. Sometimes a distinction is made between pronouns that follow (anaphoric) and pronouns that precede the antecedent (cataphoric) (e.g. Lyons 1977: 659). Often, however, the term 'anaphoric' is used in a way that subsumes anaphoric and cataphoric reference. Our reason for excluding pronouns with cataphoric reference from the study is that the role of memory in cataphoric reference is less clear than in anaphoric reference. The exclusion of cataphoric pronouns subsumes empty subjects such as those found in *it*-clefts. These are excluded since they should be classified as cataphoric – if they have reference at all.

(6) det er faderen der sidder på tæppet
'it is the father that is sitting on the blanket'

Pronouns used in cited speech were also excluded since – even if they are deictic – they may to some degree depend on memory for reference resolution. Indefinite pronouns, including generic pronouns, like *et eller andet, noget* 'something' and *man* 'one-generic' were excluded because these often neither have deictic nor anaphoric reference. In the case of the generic pronoun *man*, this might imply a source of error and distort the proportion of the use of deictic pronouns since it is in some cases used as an alternative to a first person pronoun (*Jeg ser – man ser* 'I see – one sees').

3.3 Statistical analysis

Our data are limited, but we tentatively used Fisher's exact test to assess whether the anaphoric-deictic pronoun ratios we found in the speech of JA differ significantly from those we found in the speech of the control group.

4. Results

We analysed 584 pronouns, 303 anaphoric and 281 deictic ones. The agrammatic subject produced 10 anaphoric and 29 deictic pronouns, while the controls produced 251 anaphoric and 228 deictic pronouns. These numbers include the ambiguous cases (cf. section 3.2). In a second analysis, we have subtracted the ambiguous cases. The agrammatic subject produced 7 clear (i.e. unambiguous) cases of anaphoric pronouns and 23 clear cases of deictic pronouns. The controls produced 232 clear cases of anaphoric pronouns and 143 clear cases of deictic pronouns. Overall, the controls produced more pronouns (control mean = 9.5 pronouns per 100 words) than JA (6.9 pronouns per 100 words). Hence, there is a general decrease in the number of pronouns produced by JA. This does not tell us, however, whether the distribution of anaphoric and deictic uses is the same.

Table 1 gives the anaphoric-deictic pronoun ratios for JA and the control group overall as well as for the individual tasks. It also gives two-tailed P-values, obtained by Fisher's exact test, for the differences between JA and control ratios. For absolute figures and individual control results, see Appendix and below.

As can be seen in Table 1, the anaphoric-deictic pronoun ratios found for JA were consistently lower than those found for the control group – both overall and in each of the individual tasks. Overall as well as in the picture descriptions and narratives, in fact, JA's ratios were below 1, while the control group ratios were above 1; thus, JA produced fewer anaphoric than deictic pronouns, whereas the control group produced more anaphoric than deictic pronouns. The overall difference in anaphoric-deictic pronoun ratios is highly significant by Fisher's exact test, both when dubious classifications are included and when they are excluded. That is, the anaphoric pronouns are significantly more impaired than the deictic ones. In fact, our results indicate that only the anaphoric pronouns are impaired: JA produced 1.77 anaphoric pronouns per 100 words (1.24 clear cases), while the controls produced, on average, 5.0 anaphoric pronouns per 100 words (4.6 clear cases), that is, more than three times as many as JA. In contrast, the figures for deictic pronouns are comparable across the groups: JA produced 5.13

deictic pronouns per 100 words (4.07 clear cases), whereas the controls produced, on average, 4.5 deictic pronouns per 100 words (2.8 clear cases).

		Anaphoric/deictic ratio – total	Anaphoric/deictic ratio – clear cases
Overall	JA	0,34	0,30
	Controls	1,10	1,62
	Fisher's exact	P=0.0014*	P<0.0001*
Interview	JA	0,50	0,29
	Controls	0,54	0,45
	Fisher's exact	P=1.000	P=0.4362
Picture description	JA	0,67	0,67
	Controls	1,56	4,76
	Fisher's exact	P=0.3861	P=0.0473*
Narrative	JA	0,08	0,17
	Controls	2,36	9,17
	Fisher's exact	P<0.0001*	P<0.0001*

Table 1. Anaphoric-deictic pronoun ratios for the patient and the control group, with two-tailed P-values obtained by Fisher's exact test; * indicates significance at a threshold set to 0.05.

As also shown in Table 1, the anaphoric-deictic pronoun ratios of JA do not differ significantly from those of the control group in all tasks. In particular, while a highly significant difference is found in the narrative task, the difference in the interview task is not significant at all. This variation can be attributed to the nature of the tasks (rather than, for instance, to gender or age differences in the control group). The narrative task calls for anaphoric pronouns to track referents through the narration, and to establish textual coherence. Since our hypothesis is that anaphoric pronoun production is selectively affected in agrammatism, it is natural to expect that the hypothesis is confirmed most clearly in the narrative task. In contrast, the interview task calls for the use of deictic pronouns – especially, 1st person pronouns – and it would therefore seem badly suited for testing a hypothesis centred on anaphoric pronouns.

Above, we have compared JA with the controls as a group. The patterns found at group level hold also, with one exception, for the clear cases of pronouns when JA is compared to each of the controls individually, as can be seen in the Appendix: For each task as well as overall, JA's anaphoric-deictic pronoun ratio JA was consistently lower than the ratios for the control individuals. The exception

is found in the interview task, for which control subject 03 ('CTRL 03') had a ratio which equals that found for JA.

5. Discussion

Our primary hypothesis was that anaphoric pronouns are more impaired than deictic pronouns in the speech of individuals with agrammatism. Therefore, we compared the production of anaphoric and deictic pronouns in a speech sample obtained from one individual with agrammatism, JA, with the production of anaphoric and deictic pronouns in speech samples obtained from six control subjects.

The results support our hypothesis. Firstly, JA produced fewer pronouns than the controls, which indicates that her pronoun production is impaired. Secondly, her anaphoric-deictic pronoun ratios were consistently below one, both overall and in all subsamples, while those of the control group were above one, overall and in all subsamples except the interview sample. Thus, JA consistently produced less anaphoric than deictic pronouns, whereas the control group tended to produce more anaphoric than deictic ones. Thirdly, JA's overall anaphoric-deictic pronoun ratio was significantly lower than that of the controls, which entails that her production of anaphoric pronouns is more impaired than her production of deictic pronouns.

In fact, our results suggest that only the anaphoric pronoun production is impaired at all, and that the deictic pronoun production is unaffected. JA produced less than one third of the anaphoric pronouns produced per 100 words on average by the controls, whereas JA and the controls produced comparable proportions of deictic pronouns.

Our hypothesis was based on the theoretical assumption that only anaphoric pronouns depend on memory for reference resolution. Our results therefore support this assumption, as well as a link between memory and Broca's area (which is damaged in JA's case). More generally, the results support procedural accounts of agrammatism. For instance, they are compatible in general terms with Kolk's (1995) suggestion that individuals with agrammatism adapt their language to prevent processing overload (Kolk 1995: 299), and with Caplan's (2012) claim that agrammatism is due to a reduction of processing resources, possibly a loss of working memory capacity (Caplan 2012: 47).

The overall difference between anaphoric-deictic pronoun ratios seems to be due mainly to the difference in the narrative subsample. In the interview subsample, there was no significant difference between JA and the controls, and in

the picture-description subsample, the difference was significant only when dubious pronoun classifications were excluded (cf. Table 1). This pattern might be expected. The interview as an autobiographic task is a context that would invite the speakers to use a lot of deictic pronouns, in particular forms referring to the 1st person, since the task requires the subject to refer to her- or himself. The lack of a difference in the interview task might thus be due to the fact that the task does not invite the use of a lot of anaphoric pronouns in the first place. In contrast, especially the narrative task and to some degree the picture description task invite for use of anaphoric pronouns, since these tasks require reference to already mentioned referents in constructing a narration.

The results raise the question how JA manages to communicate with so few anaphoric pronouns. A qualitative analysis reveals that in many cases, where one would expect an anaphoric pronoun, JA uses a proper name, a noun or a noun phrase with a noun in it. An example of this is found in (7), where JA consistently uses the proper name *DL* to refer to her ex-boyfriend, also in places where an anaphoric pronoun would be expected.

(7) Ekskæreste hedder DL. Og DL og jeg kommunikerer fordi DL tid
'Ex-boyfriend is called DL. And DL and I communicate because DL time'

It should be noted that proper names, nouns or noun phrases also appear in contexts where one would expect a deictic pronoun. However, deictic pronouns are 'substituted' to a far lesser degree than anaphoric pronouns.

Finally, it should be stressed that our results should be considered with caution as they are based on limited data.

6. Conclusion

Research on pronouns in aphasia has focused on the distinction between clause-internally and clause-externally referring anaphoric pronouns and, recently, the distinction between lexical and grammatical pronouns. The present study is the first to deal with the distinction between anaphoric and deictic pronouns. Based on data from one Danish speaker with agrammatism and six non-brain-damaged controls, it was shown that anaphoric pronouns are more impaired than deictic pronouns – in fact, only anaphoric pronouns seem to be impaired at all.

These findings were expected, based on the assumption that only anaphoric pronouns depend on memory for reference resolution, and based on the link between Broca's area and memory (e.g. working memory or procedural memory).

The findings thus support not only established ideas about pronouns, but also procedural accounts of agrammatism in terms of cognitive resource reduction. They also suggest the contours of yet another piece in the complex puzzle of pronoun production. Together, the distinction between anaphoric and deictic pronouns, the distinction between lexical and grammatical pronouns, and perhaps the distinction between clause-externally and clause-internally referring pronouns may give a detailed idea of the causes of agrammatism and other types of aphasia, and a powerful tool for differential diagnosis. The present study is based on limited data, however, and needs to be followed up by studies of larger data sets and structured tasks designed to control for context-dependent variation.

References

Avrutin, S. (2000). Comprehension of Discourse-Linked and Non-Discourse-Linked Questions by Children and Broca's Aphasics. In Y. Grodzinsky, L. P. Shapiro & D. Swinney (Eds.), *Language and the Brain: Representation and Processing* (pp. 295-313). San Diego, CA: Academic Press.

Avrutin, S. (2006). Weak Syntax. In Y. Grodzinsky & K. Amunts (Eds.), *Broca's region* (pp. 49-62). Oxford: Oxford University Press.

Avrutin, S., Lubarsky, S. & Greene, J. (1999). Comprehension of contrastive stress by Broca's aphasics. *Brain and Language, 70*(2), 163-86.

Bos, L., Dragoy, O., Avrutin, S., Iskra E., & Bastiaanse, R. (2014). Understanding discourse-linked elements in aphasia: A threefold study in Russian. *Neuropsychologia, 57*, 20-28.

Boye, K. & Harder, P. (2012). A usage-based theory of grammatical status and grammaticalization. *Language, 88*(1), 1-44.

Caplan, D. (2012). Resource reduction accounts of syntactically based comprehension disorders. In R. Bastiaanse & C. K. Thompson (Eds.), *Perspectives on agrammatism (Brain, behaviour and cognition)* (pp. 34-48). London: Psychology Press.

Edwards, S. & Varlokosta, S. (2007). Pronominal and anaphoric reference in agrammatism. *Journal of Neurolinguistics, 20*(6), 423-444.

Goodglass, H. & Kaplan, E. (1983). *Boston diagnostic aphasia examination booklet.* Philadelphia, PA: Lea & Febiger.

Grodzinsky, Y., Wexler, K., Chien, Y., Marakovitz, S. & Solomon, J. (1993). The Breakdown of Binding Relations. *Brain and Language, 45*(3), 396-422.

Hansen, E. & Heltoft, L. (2011). *Grammatik over det danske sprog*. Copenhagen & Odense: Det Danske Sprog- og Litteraturselskab, DSL Syddansk Universitetsforlag.

Ishkhanyan, B., Sahraoui, H., Harder, P., Mogensen, J. & Boye, K. (2017). Grammatical and lexical pronoun dissociation in French speakers with agrammatic aphasia: A usage-based account and REF-based hypothesis. *Journal of Neurolinguistics, 44,* 1-16.

Kolk, H. (1995). A Time-Based Approach to Agrammatic Production. *Brain and Language, 50*(3), 282-303.

Martínez-Ferreiro, S., Reyes, A. & Bastiaanse, R. (2017). Overcoming discourse-linking difficulties in aphasia: The case of clitic pronouns. *Clinical Linguistics & Phonetics*, *31*(6), 459-477.

Martínez-Ferreiro, S. & Boye, K. (2018). *The Danish Aphasia Corpus*. University of Copenhagen database.

Martínez-Ferreiro, S., Ishkhanyan, B., Rosell-Clarí, V. & Boye, K. (2019). Prepositions and pronouns in connected discourse of individuals with aphasia. *Clinical Linguistics & Phonetics, 33*(6), 497-517.

Mayer, M. (1969). *Frog, where are you?* New York: Dial Press.

Messerschmidt, M., Boye, K., Overmark, M. M., Kristensen, S. T. & Harder, P. (2018). Sondringen mellem grammatiske og leksikalske præpositioner [The distinction between grammatical and lexical prepositions]. *Ny forskning i grammatik, 25,* 89-106.

Lyons, J. (1977). *Semantics*. Cambridge: Cambridge University Press.

Löbner, S. (2013). *Understanding semantics* (2nd ed., Understanding language). New York, NY: Routledge.

Piñango, M. & Burkhardt, P. (2005). Pronominal Interpretation and the Syntax-Discourse Interface: Real-time Comprehension and Neurological Properties. In A. Branco et al. (Eds.), *Anaphora Processing: Linguistic, cognitive and computational modelling* (pp. 221-237). Amsterdam: John Benjamins Publishing Company.

Rogalsky, C., Matchin, W. & Hickok, G. (2008). Broca's area, sentence comprehension, and Working Memory: An fMRI study. *Frontiers in Human Neuroscience, 2,* 14.

Stavrakaki, S. & Kouvava, S. (2003). Functional categories in agrammatism: Evidence from Greek. *Brain and Language, 86,* 129-141.

Thompson, C. K. & Bastiaanse, R. (2012). Introduction to agrammatism. In R. Bastiaanse & C. K. Thompson (Eds.), *Perspectives on agrammatism* (pp. 5-30). London: Psychology Press.

Ullman, M. T. (2013). The role of declarative and procedural memory in disorders of language. *Linguistic Variation, 13*(2), 133-154.

Appendix: Individual results per task

		A/D pronouns produced TOTAL	A/D ratio TOTAL	A/D pronouns produced CLEAR CASES	A/D ratio CLEAR CASES
	JA	10/29	0.34	7/23	0.30
Overall	**CTRL01**	42/49	0.86	39/29	1.34
	CTRL02	36/55	0.65	29/33	0.88
	CTRL03	46/47	0.98	45/36	1.25
	CTRL04	51/34	1.5	49/24	2.04
	CTRL05	21/4	5.25	21/0	--
	CTRL06	55/39	1.41	49/21	2.33
Interview	**JA**	7/14	0.50	4/14	0.29
	CTRL01	8/19	0.42	8/18	0.44
	CTRL02	15/29	0.52	8/25	0.32
	CTRL03	11/36	0.31	10/34	0.29
	CTRL04	19/16	1.19	19/15	1.27
	CTRL05	13/17	0.76	10/15	0.67
	CTRL06	9/21	0.43	6/18	0.33
Picture description	**JA**	2/3	0.67	2/3	0.67
	CTRL01	13/17	0.76	13/7	1.86
	CTRL02	9/18	0.5	9/7	1.29
	CTRL03	12/5	2.4	12/0	--
	CTRL04	16/11	1.45	16/6	2.67
	CTRL05	29/7	4.14	29/0	--
	CTRL06	21/6	3.5	21/1	21
Narrative	**JA**	1/12	0.08	1/6	0.17
	CTRL01	21/13	1.62	18/4	4.5
	CTRL02	12/8	1.5	12/1	12
	CTRL03	23/6	3.83	23/2	11.5
	CTRL04	16/7	2.29	14/3	4.47
	CTRL05	21/4	5.25	21/0	--
	CTRL06	25/12	2.08	22/2	11

A/D: Anaphoric/deictic; --: noncalculable

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BILINGUAL STRATEGIES FOR APHASIA: EVIDENCE FROM TYPOLOGICALLY CLOSE LANGUAGES

Abstract: Communication deficits may affect the ability of bilingual individuals to select an appropriate linguistic code for a given context (Muñoz, Marquardt & Copeland 1998). This may result in the combination of different languages in an utterance or the insertion of isolated words from another language in otherwise monolingual exchanges (Gloning & Gloning 1965; Mosner & Pilsch 1971). In order to characterize the use of code switching (CS) and code mixing (CM) in Catalan-Spanish individuals with aphasia (IWAs), we analyzed spontaneous speech samples of 300 words in 4 participants, 1 with moderate motor aphasia, 1 with moderate mixed aphasia (predominantly motor) and 2 age-matched non-brain-damaged controls (NBDs). Different patterns were found across IWAs. IWA01 produced more instances of CM: 45.4% of the output he produced in Catalan consisted of isolated words in otherwise Spanish utterances. The other participant, IWA02, produced more instances of CS: 38.5% of the Catalan output consisted of full clauses. For both IWAs, the isolated Catalan words produced were all lexical words; grammatical Catalan words were produced only in the context of other, lexical Catalan words. In line with Abutalebi and Green (2007), our results seem to indicate that moderate aphasias of motor predominance can result in a disruption of the activation/inhibition mechanism at play in bilingual individuals. This may manifest itself in different forms. However, CM is still constrained. While lexical words in the non-target language can appear in isolation, grammatical words are restricted to appearing in the context of lexical words from the non-target language. We attribute these restrictions to differences in prominence and dependency properties between grammatical and lexical words (Boye & Harder 2012).

Key words: bilingualism, aphasia, code-switching, code-mixing, romance languages.

1. A word on bi-/multilingualism & bi-/multilingual aphasia

At the turn of the 20th century, more than half of the world population was considered to be multilingual (Grosjean 1982 1994). Currently, this number is almost 70% (Weisensee 2007). Quantification of the bilingual or multilingual population of the world depends on the way we define these terms, which we use interchangeably in this paper. Traditional definitions vary across authors, and can be arranged in a continuum defined by the underlying concepts of competence vs. performance or command vs. use. The continuum is framed by two distant positions. On the one end we have views such as Haugen's (1953), who claimed that people who could produce complete meaningful utterances in a language other than the native language are to be considered bilingual. On the other end, we have more restrictive views such as Bloomfield's (1933), who claimed that only native-like control of two languages is to be accepted. In between, we have the views of Mackey (1962), who claims that bilingualism is the ability to use more than one language, and Weinriech (1953), claiming that bilingualism consists of the alternating use of two languages.

Nowadays, language use plays a central role in most definitions. Accordingly, the concept of balanced bilinguals, corresponding to Bloomfield's proposal, is abandoned as a definiens. In this paper, we will adopt Grosjean's (1994) proposal and define bilinguals as those individuals who use more than one language or dialect in their everyday lives (Grosjean 1994; Fabbro, 2001). This view is, however, far from unproblematic given that variability across individuals classified as bilinguals is going to be remarkable.

Variability is going to have a direct impact on the individual characteristics of language use and the observed deficits in case of brain damage. In the realm of language pathologies different phenomena will have to be considered. These include differential recovery and generalization patterns, the implementation of differential strategies such as the use of code switching and code mixing (crucial for our discussion here), and emergence of pathological fixations or alternations and translation disorders.

1.1 Brain damage and bilingualism

In 1770, Johann Gesner provided what is probably the first description of dissociation in language performance in different languages in the event of brain damage. After testing the reading skills of an individual in Latin and German, Gesner observed that whereas Latin was preserved, German was not. During the

18th and 19th century, interest increased due to figures such as Jacques Lordat (1773-1870), Théodule-Armand Ribot (1839-1916), and Albert Pitres (1848-1928).

In 1895, Pitres published the *Etude sur l'aphasie chez les polyglottes* "Study on aphasia in polyglots". In this early work, he established that more familiar languages are recovered first (Pitres' law) and that comprehension tends to precede production during the recovery process. This contradicts Ribot's (1882) law according to which the native language is the one to be recovered first.[1]

Interestingly, Pitres (1895) also suggested that "cortical centers for language" are to be held responsible for the symptoms observed in bilingual patients. This position, later to be know as a 'dynamic view', would become the most agreed upon position. Deficits are seen as alterations in the system of language control (Pitres 1895; Abutalebi & Green 2007; Green 1986; Green & Price 2001; Paradis 1998; 2004). This stands in opposition to the more traditional 'localizationist' view, according to which bilinguals' languages are represented in different brain areas or even hemispheres (Albert & Obler 1978).

Pitres (1895) also acknowledged the possibility of differential recovery routes varying across individuals. These include parallel, selective and successive recovery. In two seminal works published in 1977 and 2001, Paradis provided an exhaustive list of all possible observable recovery patterns in bilingual aphasia (see Table 1), indicating that parallel recovery is the most commonly attested pattern. Similar evidence was provided by Fabbro (2001): parallel recovery 65%, greater impairment of L2 20%, greater impairment of L1 15%.

These patterns may be influenced by both pre- and post-stroke physical and psychological factors (Kiran 2009). Among the pre-stroke factors, the degree of bilingualism, the context and age of acquisition, the structural distance among languages, and the domain of use of each language have been found to play a role. Post-stroke factors such as neurological damage, aphasia type, and severity are also to be taken into consideration together with psychological factors such as the emotional bond with each language (Gómez-Ruiz 2010; Gitterman et al. 2012). This complexity limits the outcome predictability and calls for individual solutions for each bilingual person with aphasia (see Kuzmina et al. 2019 for a recent meta-analysis).

[1] Note that Ribot's Law derives from his work on retrograde amnesia, where recent memories are more susceptible to be lost than the more remote ones.

Pattern	Definition	Prevalence
Parallel recovery	Both languages impaired & recovered at the same rate	61%
Differential recovery	Languages recover differentially relative to their premorbid levels	18%
Selective recovery	One language is not recovered	5%
(Alternating) antagonistic recovery	One language recovers to a certain extent & starts regressing when the other begins to recover	--
Successive recovery	Recovery of the second language may begin after the first has recovered	--
Mixed/Blended recovery	Mixed patterns or mutual interference between languages	7%

Table 1. Recovery patterns in bilingual aphasia (Paradis 2001)

Although still scarce or unavailable for many languages, different tests have been designed to characterize language deficits in bilingual and multilingual individuals. The most widely know test is the *Bilingual aphasia test* (Paradis & Libben 1987; Paradis 2001). Other aphasia batteries available for bilingual Spanish speakers are the *Multilingual Aphasia Examination* (Rey & Benton 1991; Benton, Hamsher & Sivan 1994), standardized and normed on American Spanish, and monolingual batteries available in a wide variety of languages such as the *Western Aphasia Battery* (Kertesz, Pascual-Leone & Pascual-Leone 1990), the *Psycholinguistic Assessment of Language Processing in Aphasia* (Kay, Lesser & Coltheart 1992), and the *Boston Diagnostic Aphasia Examination* (Goodglass & Kaplan 1986; Spanish norms available in Rosselli, Ardila, Florez & Castro 1990). These tests help identifying the relative degree of impairment or preservation of each individual and language.

1.2 Code Switching and Code Mixing

Communication deficits may affect the ability of bilingual individuals to use appropriate linguistic codes in a given context (Muñoz, Marquardt & Copeland 1998). This may result in: a) the combination of different languages in an utterance, generally referred to as code switching (CS), or b) the insertion of

isolated words from another language in otherwise monolingual exchanges, known as code-mixing (CM) (Gloning & Gloning 1965; Mosner & Pilsch 1971).[2]

These two phenomena appear frequently in the speech output of non-brain-damaged bilinguals; note for instance the existance of varieties such as Spanglish, a combination of Spanish and English which is used in some cases as an identity signature among minorities in the United States. Hence, it is important to establish a distinction between CS and CM on the one hand and pathological CS and CM on the other. We refer to pathological CS and CM in the event of improper combinations of elements from two or more languages in the same word or sentence. Combinations may appear at different levels (phonological, morphological, lexical, syntactic, semantic). In example (1a), the lexical word *store* appears in an otherwise Spanish sentence. In (2a), different phrases are produced in different languages; for comparison, the Spanish version is provided in (1b) and (2b).

(1) Code mixing:
   a. Vamos a la *store* = Spanish sentence + English N
   b. Vamos a la tienda 'We go to the store'

(2) Code switching:
   a. Fue *la meva dona* = Spanish V + Catalan NP
   b. Fue mi mujer 'It was my wife'

According to Albert and Obler (1978), CS and CM are observable in around 7% of bilingual individuals with aphasia. In a study of a patient with a frontal lesion, Fabbro, Skrap and Aglioti (2000) found that CS in L1 was less prevalent than in L2 (71 vs. 94) in the bilingual aphasia test. CM was almost nonexistent (2 in L1; 0 in L2). In the same test, the examiner produced 0 instances of CS and CM in L1 and L2.

In addition to CS and CM, bilingual individuals with aphasia may also display cases of pathological fixation, pathological alternations and translation disorders. Pathological fixation prevents the speaker from switching to another language present in his/her repertoire. Pathological alternations consist of the use of uncontrollable and frequently alternating complete sentences in different

[2] Definitions vary among scholars and disciplines. For instance, code mixing is sometimes linked to the language system ('competence'), whereas code switching is used to refer to observable changes in language use.

languages. Translation skills may also be altered in the event of brain damage. Among translation disorders, we find the inability to translate in any direction, the compulsive need to translate everything (spontaneous translation), translation without understanding (patients do not understand but they can translate), and paradoxical translation (ability to translate into a language that is inaccessible, linked to the inability to translate the language that can be used). Code-switching/mixing and translation disorders are not mutually exclusive.

1.3 Theoretical background and aim of the study

As noted in sections 1.1. and 1.2, there are two main topics in the study of bilingual aphasia: 1) recovery and generalization patterns, including the organization of languages in the brain, cognitive control, the role of acquisition, and the factors affecting recovery; and 2) pathological code switching and code mixing (Gitterman Goral & Obler 2012). In this paper we deal with the second topic. More specifically, we aim at determining whether there are different constraints on the use of grammatical than on lexical words from the non-target language.

Our distinction between lexical and grammatical words is based on the theory of the grammatical vs. lexical distinction in Boye and Harder (2012). In this theory, lexical words are defined in terms of the potential to express the discursively primary (or foreground) point of a linguistic message and in terms of the possibility of constituting the only word in an utterance (as in *Car!* or *Fire!*). In contrast, grammatical words are defined as conventionalized carriers of discursively secondary (or background) information, and thus as dependent on combination with a lexical 'host' word for expression (cf. the fact that the auxiliary *gonna* cannot constitute an utterance on its own).

These definitions entail a diagnostics for identifying and distinguishing lexical and grammatical words. Since only lexical words have the potential to express the discursively primary point of an utterance, only lexical words can be pointed out as discursively primary by means of focalization or addressation, and only lexical words can be modified (since modification entails elaboration, and elaboration has a foregrounding effect) (see Boye & Harder 2012, on focalization and addressation, and Messerschmidt et al. 2018 on modification). In contrast, grammatical words, being coded as discursively secondary, resist focalization, addressation and modification (outside metalinguistic and corrective contexts, where the code (i.e. the concevention) is overridden; see Boye & Harder 2012: 8-9,

17-18 for further discussion). In addition, only lexical words can be the sole element in an utterance; grammatical words cannot.

Based on these diagnostics, we compare the production of lexical non-target-language-words with the production of grammatical non-target-language-words in bilingual Catalan-Spanish individuals with stroke-induced aphasia and in matched non-brain-damaged individuals. Based on the definitions of lexical and grammatical words in Boye and Harder (2012), we hypothesize a specific difference between the use of grammatical and lexical non-target-language-words: since grammatical words depend on a lexical host, we expect that non-target-language-words appearing in isolation in the target language will not be grammatical, but lexical. This hypothesis entails that the contrast between grammatical and lexical words plays an important role in shaping the language patterns of bilinguals with aphasia – side by side with factors such as premorbid proficiency and language use (Kuzmina et al. 2019).

2. Methodology

2.1 Participants

Four Spanish-Catalan bilingual informants participated in the study: 2 participants with moderate chronic non-fluent aphasias (PWAs; male, mean age 60.5) and 2 age-matched non-brain-damaged controls (NBDs; male, mean age 57.5). The 2 PWAs were proficient in Spanish premorbidly. Background information about participants is found in Appendix 1.

2.2 Data collection

Data were collected by means of a semi-standardized interview fully conducted in Spanish in order to control for language mode (in line with Grosjean 2000). The interview included questions about the informants' last job and holidays (Rosell 2005). 300 word samples were analyzed. Quantitative and qualitative analyses were conducted. All instances of CS and CM were annotated. CM and CS were identified and distinguished in accordance with the definition given in Section 1.2: insertions of isolated words from another language in otherwise monolingual passages were identified as cases of CM; combination of different languages not limited to single-word instances were identified as cases of CS. Spanish-Catalan cognates were treated as Spanish words and therefore not considered cases of CS or CM.

3. Results

No instances of CS or CM were detected in the speech output of the 2 informants in the NBD group. Hence, we will focus on the results of the PWA group alone.

Out of the total of 300 words analyzed per participant, PWA 01 produced 10.33% in Catalan, while PWA 02 produced 16%. Substitutions were found both at the word and at the sentence level as illustrated in Figure 1 below:

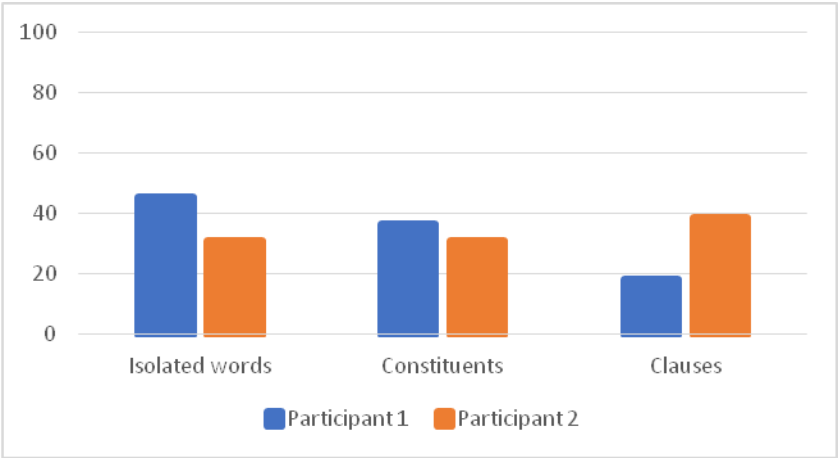

Figure 1. Catalan elements in Spanish discourse per participant

However, different patterns were found across informants. PWA 01 produced more instances of CM: 45.4% of the output he produced in Catalan consisted of isolated words in otherwise Spanish utterances. PWA 02 produced more instances of CS: 38.5% of the Catalan output consisted of full clauses (see Appendix 2).

As for the distinction between lexical and grammatical non-target-language-words, both PWAs show the same pattern: all non-target-language-words appearing in isolation in the target language are lexical. No instances of isolated grammatical non-target-language-words were detected. Consider (3), where italics indicate Catalan words/clauses in an otherwise Spanish discourse. (3a) contains an isolated lexical non-target-language-word: the lexical (i.e. focalizable and modifiable) Catalan adverb *ara* ('now') appears in isolation in a Spanish utterance. (3b) contains grammatical non-target-language-words (*i* 'and' and possibly *al* 'to the', the latter of which is however identical for Spanish and Catalan); in contrast to *ara* in (3a), these grammatical Catalan words are found in the context of other

Catalan words. Specifically, they co-occur with a lexical host: the lexical pronoun *nostre* which constitutes the prepositional complement of *al*.

(3) a. o sea *ara* últimamente # el vino quince días # (PWA 01)
that is *now* lately # he came 15 days #
b. *anem al nostre i* # por la tarde # no (PWA 02)
we go to-the ours and # in the afternoon # no

In contrast to PWA 01, PWA 02 also produced 2 examples of translation.

(4) a. Por la *manana # *demana # *demà* # (PWA 02)
In the morning # morning # tomorrow #
b. <*em*> <e*m*> me dejé
I… I… I

In (4b), PWA 02 starts producing the Catalan reflexive pronoun *em*. This is a grammatical word and thus cannot be produced in isolation. Rather than producing the accompanying lexical word in Catalan, however, the speaker switches back to Spanish, translating the pronoun into Spanish *me* and producing the accompanying lexical verb *dejé*: *me dejé* 'I go'.

4. Discussion

Moderate aphasias of motor predominance can result in a disruption of the activation/inhibition mechanism at play in bilingual individuals (cf. Abutalebi and Green 2007). In the present case, similarities between the target language (Spanish) and the other language spoken by the informants (Catalan) may favor the change of code. However, CM is still constrained by the lexical-grammatical distinction. CM, consisting in the insertion of isolated words, is only possible with lexical elements.

Bi-/multilinguals may allow for one language to influence the lexicon and/or the grammar of another language(s) by means of 'interferences' or 'transfers' (Weinreich 1953). But we found that while lexical words in the non-target language can appear in isolation, grammatical words are restricted to appearing in a context where they co-occur with a lexical 'host' word from the same language.

As discussed in Section 1.3, we hypothesized this difference between lexical and grammatical non-target-language-words based on the difference in dependency claimed by Boye and Harder (2012): grammatical words depend on

the co-occurrence with a lexical host, whereas lexical words can sometimes stand alone; because of this, we argued, grammatical non-target-language-words are unlikely to be found in isolation in the target language.

This line of reasoning is not entirely accurate, however. Nothing in Boye and Harder (2012) precludes that a grammatical element from one language would co-occur with a lexical host from another language. Such co-occurrences are in fact found in non-brain-damaged speech, as witnessed by example (1), where the grammatical Spanish article *la* co-occurs with the lexical English word *store*. In order to explain our main finding, then, we need to supplement the dependency account with an assumption that the language of a selected lexical element will define the language of the grammatical elements that depend on it. This in turn entails that the activation/inhibition mechanism at play in bilingual individuals may not be completely inoperative in aphasia (although of course dependent on the degree of severity of the agrammatic deficit).

This discussion must of course be seen in light of the fact that our data are limited.

5. Conclusion

Bilingual individuals with aphasia may resort to another language to overcome difficulties in their speech output. However, although the use of CM and CS differs across individuals, CM is restricted by the lexical-grammatical contrast. Specifically, our data suggest that bilingual individuals with aphasia may produce lexical words in isolation when they switch to the non-target language, but not grammatical words.

This has implications for the clinical practice. According to Junque, Vendrell, Vendrell-Beret and Tobena (1989), a.o., language mixing is frequently observed during the course of recovery of bilingual individuals with aphasia. Our results seem to indicate that bilingualism can be used to enhance the communicative effectiveness of individuals with aphasia, in typologically close languages in bilingual societies.

References

Abutalebi J. & Green D. W. (2007). Bilingual language production: The neurocognition of language representation and control. *Journal of Neurolinguistics, 20*, 242–275.

Albert, M. & Obler, L. (1978). *The bilingual brain: Neuropsychological and neurolinguistic aspects of bilingualism*. New York: Academic Press.

Benton, A. L., Hamsher, K. de S. & Sivan, A. B. (1994). *Multilingual Aphasia Examination: Manual of instruction*. Iowa City: AJA Associates.

Bloomfield, L. (1933). *Language*. New York: Holt.

Boye, K. & Harder, P. (2012). A usage-based theory of grammatical status and grammaticalization. *Language, 88,* 1-44.

Fabbro, F. (2001). The bilingual brain: bilingual aphasia. *Brain and Language, 79,* 201-210.

Fabbro, F., Skrap, M. & Aglioti, S. (2000). Pathological switching between languages after frontal lesions in a bilingual patient. *Journal of Neurology, Neurosurgery, and Psychiatry, 68,* 650-652.

Gesner, J. A. P. (1770). Die Sprachamnesie. In Sammlung von Beobachtungen aus der Arzneygelahrtheit und Naturkunde (Collection of Observations of the Pharmaceutical Erudition and Natural Science), vol. 2. Nordlingen: CG Beck.

Gitterman, M. R., Goral, M. & Obler, L. K. (Eds.) (2012). *Aspects of multilingual aphasia*. Bristol: Multilingual Matters.

Gloning, L. & Gloning, K. (1965). Aphasien beipolyglotten. Beitrag zur dynamik des sprachabbausowie zur lokalisation frage dieser storangen. *Weiner Zeitschrift fur Nervenheikunde, 22,* 362-397.

Gómez-Ruiz, M .I. (2010). Bilingualism and the Brain: Myth and reality. *Neurología, 25,* 443-452.

Goodglass H. & Kaplan E. (1986). *Evaluación de la afasia y de transtornos similares* [The assessment of aphasia and related disorders] (2nd ed.). Madrid: Editorial Médica Panamericana.

Green, D. W. (1986). Control, activation and resource. *Brain and Language, 27,* 210-223.

Green, D. W. & Price, C. J. (2001). Functional imaging in the study of recovery patterns in bilingual aphasics. *Bilingualism: Language and Cognition, 4,* 191-201.

Grosjean, F. (1982). *Life with Two Languages: An Introduction to Bilingualism*. Cambridge, MA: Harvard University Press.

Grosjean, F. (1994). Individual Bilingualism. In R. E. Asher (Ed.), *The encyclopaedia of language and linguistics* (pp. 1656-1660). Oxford, UK: Pergamon Press.

Grosjean, F. (2000). The bilingual's language modes. In J. Nicol (Ed.), *One mind, Two Languages: Bilingual language processing*. (pp. 1-22). UK: Blackwell.

Haugen, E. (1953). *The Norwegian Language in America: A study in bilingual beaviour*. Philadelphia: University Press of Pennsylvania.

Junque, C., Vendrell, P., Vendrell-Bruce, J, N. & Tobena, A. (1989). Differential recovery in naming in bilingual aphasics. *Brain and language, 36,* 16-22.

Kay, J., Lesser, R. & Coltheart, M. (1992). *PALPA: Psycholin-guistic Assessments of Language Processing in Aphasia*. Hove: Lawrence Erlbaum Associates.

Kertesz, A., Pascual-Leone, A. & Pascual-Leone, A. (1990). *Batería de afasias "Western"* (Western Aphasia Battery en versión y adaptación castellana). Valencia, Spain: Nau Llibres.

Kiran, S. (2009). Bilingual Aphasia: Factors affecting recovery and rehabilitation. Communication Sciences & Disorders, University of Texas at Austin. Available at http://www.bu.edu/aphasiaresearch/files/2009/11/Bilingual-Aphasia.pdf

Kuzmina, E., Goral, M., Norvik, M. & Weekes, B. S. (2019). What Influences Language Impairment in Bilingual Aphasia? A Meta-Analytic Review. *Frontiers in Psychology, 10,* 445.

Mackey, W. (1962). The description of bilingualism. *Canadian Journal of Linguistics / Revue canadienne de linguistique, 7*(2), 51-85.

Messerschmidt, M., Boye, K., Overmark, M. M., Kristensen, S. T. & Harder, P. (2018). Sondringen mellem grammatiske og leksikalske præpositioner [The distinction between grammatical and lexical prepositions]. *Ny forskning i grammatik, 25,* 89-106.

Mosner, A. & Pilch, H. (1971). Phonemic Syntactic Aphasia: A special case of motor aphasia in a bilingual patient. *Folia Linguistica, 5,* 394-409.

Muñoz, M. L., Marquardt, T. P., & Copeland, G. (1998). A comparison of code switching patterns of aphasics and neurologically normal bilingual speakers of English and Spanish. *Brain and language, 62,* 249-274.

Paradis, M. (1977). Bilingualism and Aphasia. In H. Whitaker & H. A. Whitaker (Eds.), *Studies in Neurolinguistics*, Vol. 3. (pp. 65-121). New York: Academic Press.

Paradis, M. (1998). Language and communication in multilinguals. In B. Stemmer & H. A. Whitaker (Eds.), *Handbook of neurolinguistics* (pp. 418-431). San Diego: Academic Press.

Paradis, M. (2001). Bilingual and polyglot aphasia. *Handbook of Neuropsychology* (2nd ed., pp. 69-91). Oxford: Elsevier Science.

Paradis, M. (2004). *A Neurolinguistic Theory of Bilingualism*. Amsterdam: John Benjamins.

Paradis, M. & Libben, G. (1987). *The assessment of bilingual aphasia*. Hillsdale, NJ: Erlbaum.

Pitres, A. (1895). Aphasia in polyglots. In M. Paradis (Ed.) (1983), *Readings on aphasia in bilinguals and polyglots* (pp. 26-49). Montreal: Marcel-Dieder.

Rey, G. & Benton, A. (1991). *Examen de afasia multilingüe.* Iowa City: AJA Associates Inc.

Ribot, T. A. (1882). *Diseases of memory: An essay in the positive psychology*. New York: Appleton.

Rosell-Clarí, V. (2005). *Uso del Verbo en Pacientes Afásicos Motores en Lengua Castellana*. PhD Thesis, Universitat de Valencia.

Rosselli, M., Ardila, A., Florez, A. & Castro, C. (1990). Normative data on the Boston Diagnostic Aphasia Examination in a Spanish-speaking population. *Journal of Clinical and Experimental Neuropsychology, 12,* 313-322.

Weinreich, U. (1953). *Language in contact. Findings and problems*. New York: Publications of the linguistic Circle of New York 1.

Weisensee, T. (2007). *The research of bilingual aphasia and its contribution to the study of multiple languages in one brain*. Norderstedt, Germany: Druck & Bindung.

Appendix 1: Background information of informants

Aphasia						
Participant	***Age***	***Gender***	***Etiology***	***Type of aphasia***	***Severity***	***BDAE Auditory Comp.***
ABL	46	M	CVA	Motor	Moderate	84.17
JRA	75	M	CVA	Mixed predominantly motor with signs of transcorticality	Moderate	77.15
NBDs						
Ctrl01	68	M				
Ctrl02	47	M				

Appendix 2: CS and CM in the speech output of PWA 01 & PWA 02

PWA 01		
Word nº	**Token**	**Type**
29	pantalons	ISWORD
33	camises	ISWORD
38	determinats	ISWORD
114	tiren	ISWORD
120-123	fan <molta> molta festa	CLAUSE
133-136	parlar de les falles	CONST
143-149	el moment tinc <un> un xiquet francés	CLAUSE
179-183	<de> de quant en quant	CONST
234	ara	ISWORD
270-272	les galtes roges	CONST
288-290	els quince dies	CONST
PWA 02		
Word nº	**Token**	**Type**
59-60	el poble@s	CONST
66-69	<després> <mes> després mes	CONST
82-88	<no> <no pot ser> no pot ser	CLAUSE
89-99	<ahir> ahir? <vas> <vas> vas anar <a lo> a puncharme	CLAUSE
110-111	posarme	CONST
116-125	por la manana <demana> <demana> <demà> <demà>	ISWORD
123-125	anem a misa	CLAUSE
130	sortim	ISWORD
135-142	anem <a> <a> a el nostre	CLAUSE
247	altra	ISWORD
250-251	l'altra	CONST
281-283	No ho sé	CLAUSE

ISWORD: isolated word, CONST: constituent

Part IV: Squibs

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REVIEW: SUBCORTICAL STRUCTURES, MEMORY SYSTEMS, AND THE GRAMMAR-LEXICON DIVIDE

Abstract: *Background:* Dissociating from the generative idea of an innate language module, Ullman et al. (1997) suggest that language processing is underpinned by memory systems mainly dependent on the hippocampus and the basal ganglia. Elaborating on the associations between lesions in subcortical regions, impaired cognitive functioning, and deviating linguistic profiles, Ullman's (2001a) declarative/procedural model could provide insights into the cognitive underpinnings of language processing.
Aim: In this review, I aim at investigating whether the literature supports the associations proposed by Ullman's declarative/procedural model with special focus on cases of aphasia.
Method: In PubMed, exhaustive search is done retrieving literature treating aphasia, subcortical structures, and memory systems. Based on predictions made on the linguistic profiles of patients with lesions in different subcortical structures, the literature is qualitatively analyzed in relation to Ullman's (2001a) model.
Findings: Predominantly, the studies reviewed support the associations between subcortical structures, memory systems and linguistic profiles as proposed in the declarative/procedural model. However, additional and more general executive functions of both the basal ganglia and the hippocampus in language processing are identified. That is, one should be cautious in claiming a direct association between subcortical structures and linguistic profiles.
Conclusions: To enhance the understanding of associations between memory systems and language processing, further research is necessary – especially regarding the role of the hippocampus and the declarative memory. An integrated model proposed by Boye and Harder (2017) in which Ullman's model poses a link between a pure neurobiological theory (Mogensen 2014) and a usage-based linguistic theory on the grammar-lexicon divide (Boye & Harder 2012) might serve as a starting point.

Keywords: the declarative/procedural model, aphasia, neurodegenerative disorders, basal ganglia, hippocampus, mental lexicon, mental grammar

1. Introduction

Departing from the idea that analogous computational processes and brain regions underpin both memory and language processing, Ullman (2004, 2001a, 2001b) et al. (1997) proposed a theory mapping an association between memory and language. Based on the assumption that language is composed of two major components, the *mental grammar* and the *mental lexicon*, the theory states that each component is subserved by distinct – yet interacting – memory systems: the declarative memory and the procedural memory, respectively. The declarative memory system is believed to be associated to subcortical neural routes involving mainly the hippocampus, whereas the procedural memory system is believed to be associated to subcortical neural routes involving mainly the basal ganglia (Ullman 2001a, 2001b, 2004, 2016). Further, Ullman's (e.g. 2001a) declarative/procedural model predicts a double dissociation entailing that damage to brain structures underpinning the procedural memory system will cause impairments in applying grammatical rules, whereas damage to structures underpinning the declarative memory system will cause impaired ability to access the mental lexicon. According to Ullman (2001a), pathological cases entailing language impairments support this theory – especially indicated by the difference between fluent and non-fluent cases of aphasia. The investigation of associations between language impairments and pathologies and/or brain lesions enhances the understanding of the mechanisms potentially underpinning language processing.

However, only a sparse amount of research has uncovered the proposed associations between subcortical structures, memory systems, and linguistic profiles. This review aims at assessing whether the literature focusing on both aphasias, the procedural memory / the declarative memory, and the basal ganglia / the hippocampus supports the proposals made by Ullman et al. (1997) in the declarative/procedural model.

In the following section, an account of Ullman (2001a, 2001b, 2004, 2006, 2016) et al.'s (1997) declarative/procedural model is presented. To further elaborate on the linguistic and the neurobiological proposals of Ullman (2004, 2001a, 2001b) and Ullman et al.'s (1997) model, Boye and Harder's (2012) usage-based linguistic theory on the grammar-lexicon divide, as well as Boye and Harder's (2017) integrated linguistic-neurocognitive model of language processing are introduced. In section 2, predictions based on the declarative/procedural model are provided. The methodology of the review is presented in section 3, which is

followed by the outcomes in section 4. Finally, section 5 provides a discussion on whether the findings are compatible with the predictions provided in section 2.

1.1 Ullman: the declarative/procedural model

According to Ullman (2001a), the *mental lexicon* constituting one part of language is responsible for storing words each comprised of an arbitrary combination of phonology and meaning. The *mental grammar*, on the other hand, is responsible for computing complex words, phrases, and sentences on a real time level. Based on the dissociation of two well documented memory systems, the procedural memory hosting "the learning and processing of motor, perceptual, and cognitive skills" (Ullman et al. 1997: 267) and the declarative memory as a residence for the storage of information about events and facts, Ullman et al. (1997) link the mental grammar to the procedural memory and the mental lexicon to the declarative memory. Since the declarative memory is known to be involved in conscious processing, this means that retrieving words from the lexicon is considered as being part of the conscious mind. On the other hand, computational processing subserved by the procedural memory is largely automatized, happening subconsciously (Ullman 2001a, 2004). This is compatible with the assumption that processes associated to the mental grammar are also automatized (that is, real time complex word processing and computing) (Ullman 2004).

To examine this possible dissociation between (consciously controlled) retrieval from storage and (subconscious) rule governed processes, Ullman (2001a) et al. (1997) prepared tests involving verb (ir)regularity. Since regular verbs follow predictable rules when inflected for tense (retrieving the stem and adding a suffix: *walk, walk-ed*), producing them requires interaction between the declarative memory system and the procedural memory system for real time processing (see also Macoir et al. 2010). On the contrary, irregular verbs are not predictable in this regard (*dig - dug* and *eat - ate*) and producing them might primarily rely on retrieval from storage in the declarative memory system. The possibility of retrieving a stored irregular word will overrule the processing of a rule-based word form. But if no word form – in this case, an irregular verb – can be retrieved from the lexicon, the verb will be produced following predictable rules, sometimes resulting in incorrect inflection/overregularization (e.g. *swim - swimmed*). According to Ullman (2001a), novel words will be inflected following this predictable rule since no word form is stored in the declarative memory.

Ullman (2001b) underlined that the two memory systems are shown to be subserved by distinct (sub)cortical structures that interact in the execution of specific tasks. Subconscious processing as part of the procedural memory is related mainly to the basal ganglia and frontal and parietal cortex. According to Ullman (2004), the procedural memory system is subserved by neural circuits connecting the frontal cortex and basal ganglia and possibly interconnected parts of parietal and superior temporal cortex and the cerebellum. Through interconnecting neural circuits, the basal ganglia have been shown to take part in multiple functions such as stimulus-response learning, real-time motor planning and control as well as context-dependent rule-based selection (Ullman 2004). The basal ganglia both receive and project signals through pathways interconnected to the frontal cortex including the supplementary motor area. Ullman (2004) stated that the thalamus is crucial in projecting signals from the basal ganglia to the cortex creating circuits in which feedback mechanisms are thought to exist. According to Ullman (2004), the circuits connected to the basal ganglia are computationally analogous but differ in function (e.g. applying grammatical rules) from one another with respect to the specific interconnected cortical region (e.g. Broca's area).

The declarative memory, on the other hand, is connected to medial-temporal circuits, including the hippocampus and temporal and temporoparietal regions of the cortex (Ullman et al. 1997; Ullman 2004; Eichenbaum & Cohen 2004; Alamri 2017). Networks distributed on adjacent areas in the temporal lobe are most saliently identified as underpinning the declarative memory system, but Ullman (2004) emphasized the relevance of other structures as well. For example, the prefrontal as well as the inferior frontal gyrus and Brodmann's areas 44, 45 and 47 have been shown to activate in encoding new information and retrieval from declarative memory. Ullman (2004) suggested that the thalamus might also be of relevance, since a circuit connecting the thalamus and Broca's area partly underpins the declarative memory system (Ullman 2006). Ullman (2006, 2004) claimed that the ventral system, located in inferior lateral temporal lobe structures, is also related to the declarative memory and crucial in identification of objects and storage of object knowledge.

In more recent research, though, Ullman (2006) argued that both memory systems depend on circuits connected to the basal ganglia, emphasizing even more the interaction between the two. Strengthening the role of the basal ganglia in language processing, Ullman (2006) suggested that the procedural memory and the declarative memory are each partly dependent on separate circuits connecting Broca's area and the basal ganglia. Of the two so-called basal-ganglia-

thalamocortical circuits, Ullman (2006) claimed that the more anterior one takes part in retrieval of lexical and semantic components stored in the declarative memory. The more posterior one is thought to subserve parts of the procedural memory as the circuit seems to be involved in acquisition and real time execution of motor and cognitive skills.

Departing from the idea that regular word forms are processed by rules and irregulars word forms are stored and retrieved as non-compositional words, as well as the idea that the declarative memory system subserves word storage and the procedural memory system serves the act of applying rules, Ullman et al. (1997) predicted a double dissociation. This implies that damage to specific temporoparietal regions or the hippocampus causes impairments in retrieving words from the declarative memory (leaving the mental grammar unaffected), whereas damage to the basal ganglia and/or specific regions of the frontal or frontoparietal cortex causes impairments in applying rules during real time processing of complex words (leaving the mental lexicon unaffected) (Ullman et al. 1997; Ullman 2001a).

According to Ullman (2001a) and Ullman et al. (1997), a number of pathologies support the double dissociation proposed by the D/P-model. The dissociation between distinct types of aphasia indicates that different aspects of language should be ascribed to different neural networks. Anterior non-fluent aphasia can be acquired due to lesions to Broca's area or adjacent cortex areas (left frontal regions), the inferior parietal regions, and the underlying white matter including the basal ganglia (Ullman et al. 1997; Ullman 2001a). Consequently, these patients might show agrammatic symptoms, having difficulties producing grammatical morphemes, and in accordance to Ullman's (2006) prediction regarding regulars vs. irregulars, they are better at producing irregular word forms compared to regulars. The patients might also show difficulties in articulation and syntax. On the contrary, patients suffering from posterior fluent aphasia show no impairments in articulation or syntax, but they do have problems producing content words affecting the production of irregular word forms compared to better preservation of regulars.

Similar language deficits are seen in neurodegenerative diseases. Ullman (2001a) highlighted Alzheimer's disease (AD) and semantic dementia as examples of fluent primary progressive aphasia (PPA) evidencing aspects of the D/P-model. In both Alzheimer's disease and semantic dementia, a degeneration of portions of the temporal lobe is observed. AD-patients have difficulties learning new words as well as retrieving stored "lexical and conceptual knowledge" (Ullman 2001a: 722).

They have more difficulties producing irregulars than regulars. Similar symptoms are seen in cases of semantic dementia. According to Ullman (2001a), these findings support the linking of irregular word forms to a mental lexicon and to lateral and inferior regions of the temporal lobe. Opposing this, Ullman (2001a) mentioned Parkinson's disease and Huntington's disease (also being a genetic disease) as examples evidencing other aspects of the D/P-model. In Parkinson's disease, the dopamine neurons in the basal ganglia degenerate causing decline in motor activity (hypokinesia), difficulties in motor sequencing, and potential impairments in rule programming (hence, complicating grammatical processing). Degeneration of other regions of the basal ganglia, namely the caudate nucleus, causes Huntington's disease leading to hyperkinesia together with what Ullman (2001a: 722) termed 'over-suffixation'. The patients tend to add an extra suffix to the inflected forms of regulars (e.g. *walked-ed*). According to Ullman, this supports the evidence of the basal ganglia as being of crucial importance in processing grammatical rules.

Recently, Ullman (2016) presented the *co-optation hypothesis of language* departing from the concept of reorganization/remodulation of brain structures in order to obtain the most efficient cognitive functioning. Retaining from assessing whether innateness or specialization plays a role, Ullman (2016) suggested that the two memory systems should be perceived as neurobiological domains having inculcated the cognitive function of language.

1.2 Boye and Harder: The grammar-lexicon divide and the integrated model

With regard to the fundamental perception of the cognitive function of language, Ullman et al.'s (1997) model can, according to Boye and Harder (2017), be seen as a substantiating aspect of usage-based linguistics. From a functional, usage-based point of view, Boye and Harder (2012) proposed that grammar poses a necessary component in creating and binding together complex utterances. However, grammatical elements can ultimately be left out without losing the essential meaning of an utterance. In an utterance, grammatical items are characterized as being discursively secondary in relation to the lexical items which have the potential of being discursively primary – that is, grammar is dependent of lexicon (Boye & Harder 2012). The two components should be seen in relation to one another and are not separable.

To further enhance the understanding of grammar and its function, Boye and Harder (2017) suggested integrating Ullman's D/P-model and a neurocognitive theory on neural plasticity and recovery of cognitive functions, that is, the 'Reorganization of Elementary Functions'-model (REF-model) proposed by Mogensen (e.g. 2014). According to the REF-model, three main organizational cognitive systems exist (with the second level comprised of two distinct procedures): 1) *Elementary functions* denoting specific and separable groups of neurons performing the most basic information processing. 2a) *Algorithmic strategies* are posed by activation of elementary functions combined into specific networks that are organized due to specific tasks and characterized by the appearance of routinely behavior (e.g. tying one's shoes). 2b) *Algorithmic modules* (also named 'submodules') are created on demand of the execution of more complex tasks. An algorithmic module serves as a more generalized substructure (not specialized for one specific function and serving only at a subconscious level) and so they need to combine and cooperate with other algorithmic modules in executing specific tasks. 3) *Surface phenomena* are the actual mental and/or physical manifestation in the outer-world, representing the result of problem solving at level 2 (Mogensen 2014; Boye & Harder 2017).

Boye and Harder (2017) proposed that grammatical systems should be perceived as algorithmic modules. In order to serve a specific functional purpose (that is, pass on linguistic information), grammatical elements need to combine with lexical elements (that is, other submodules) and perhaps other grammatical elements. Regarding the differentiation between grammar and lexicon, Boye and Harder (2017) stated that lexical items – by virtue of their potentially discursively primary status and that they can occur alone – are associated to the declarative memory. On the contrary, in being dependent of lexical items and enabling the combination of lexical items, grammatical elements require mechanisms to generate these connections – that is, grammatical elements are dependent on rule-based combining-procedures subserved by the procedural system. Accordingly, the ability to apply grammar – and, in that, the creation of so-called algorithmic modules – arises due to a functionally grounded organization of the requirements needed in order to communicate most efficiently (Boye & Harder 2017).

2. Predictions

Considering the proposals made by Ullman et al.'s (1997) D/P model and by Boye and Harder's (2012, 2017) linguistic and integrated model, a number of predictions of specific linguistic profiles due to brain damage can be made. First,

damage (acquired or due to degeneration) to temporal, temporoparietal cortex and/or hippocampus (or closely adjacent structures) will entail impaired functioning of the declarative memory system and, hence, distortion of the mental lexicon. Linguistically, this will be evident from patients with symptoms similar to those found in cases of fluent aphasia. This entails difficulties retrieving lexical items resulting in anomia, that is, phonemic, semantic, and verbal paraphasias. Problems with past tense irregular verbs will be salient. Their ability to construct grammatical sentences will be relatively preserved.

Further, presuming the applicability of the D/P-model, prediction can be made that damage (acquired or due to degeneration) to frontal and parietal cortex regions and/or the basal ganglia will lead to distortion of the procedural memory system which will affect the mental grammar. Linguistically, this will be evident from patients with symptoms similar to those found in cases of non-fluent aphasia. These patients might show symptoms of agrammatism, entailing difficulties producing grammatical elements and applying grammatical rules. This prominently affect the inflection of regular verbs. Both production and comprehension of syntactically complex utterances will be impaired. Since damage to regions close to Broca's area can entail impaired motor planning, patients may also show symptoms of apraxia of speech.

3. Method

To provide insight into the amount of literature focusing on Ullman et al.'s (1997) three-step associations, that is, both aphasias, the basal ganglia / the hippocampus, and the procedural memory system / the declarative memory system, an exhaustive search on six different keyword combinations was performed. In PubMed, search was done on 'Aphasia AND basal ganglia', 'Aphasia AND procedural memory', 'Aphasia AND procedural memory AND basal ganglia', 'Aphasia AND hippocampus', 'Aphasia AND declarative memory', and 'Aphasia AND declarative memory AND hippocampus'. Firstly, the amount of studies from each keyword search was analyzed quantitatively (Figure 1) by comparing the numbers of studies creating an overview of the tendency in the existing literature. Secondly, literature addressing all three keywords was analyzed qualitatively in relation to Ullman et al.'s (1997) model.

4. Results

This introductory section of the results compares the numbers of studies in the aphasia literature that have focused on aphasia in relation to the basal ganglia / the hippocampus, and the procedural memory system / the declarative memory system. In Figure 1, the amounts of studies elicited from the different keyword combinations *(a1-b3)* in PubMed are shown:

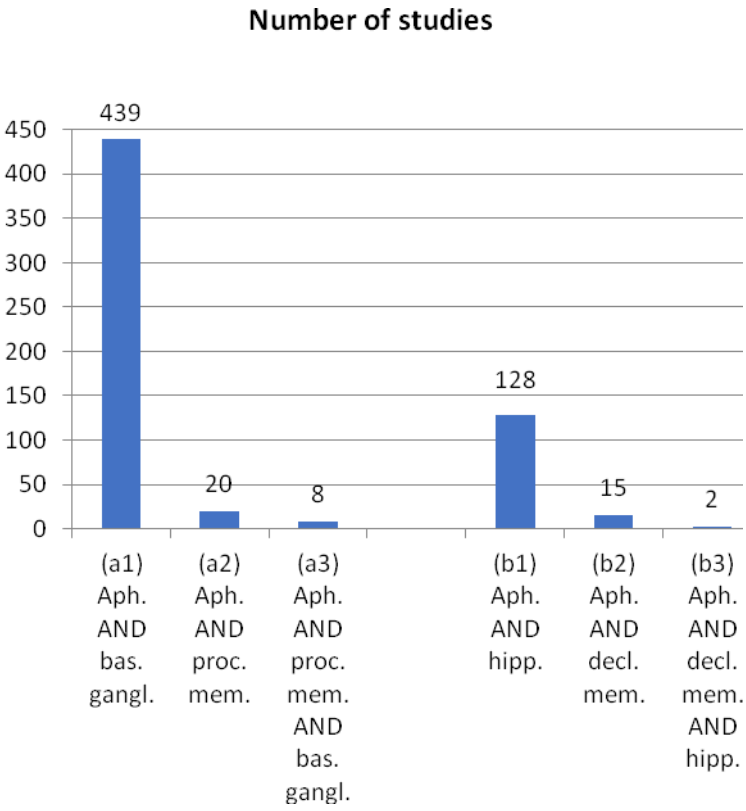

Figure 1. Keyword combinations:
(a1) 'Aphasia AND basal ganglia', (a2) 'Aphasia AND procedural memory', (a3) 'Aphasia AND procedural memory AND basal ganglia',
(b1) 'Aphasia AND hippocampus', (b2) 'Aphasia AND declarative memory', (b3) 'Aphasia AND declarative memory AND hippocampus'

Comparing keyword combinations in pairs (*a1*:*b1*, *a2*:*b2*, *a3*:*b3*), *a1*, *a2*, and *a3* each constitutes more studies compared to *b1*, *b2*, and *b3*, respectively, as

well as when adding together *a1, a2,* and *a3* (=467 studies)[1] compared to adding together *b1, b2,* and *b3* (=145 studies). This indicates that, especially, the latter aspect (mental lexicon – declarative memory – hippocampus) of Ullman et al.'s (1997) theory needs to be further uncovered. However, compared to the number of studies addressing aphasia and either the basal ganglia or the hippocampus, as well as the number of studies addressing aphasia and one of the two memory systems, Ullman et al.'s (1997) three-step associations are generally less well studied.

In the following sections, the outcomes of the qualitative analyses of the studies addressing all three keywords are presented in relation to the declarative/procedural model.

4.1 The basal ganglia-procedural memory connection and role in language processing

As stated above, based on Ullman et al.'s (1997) proposals on associations between the basal ganglia, the procedural memory, and the mental grammar, expected linguistic profiles entail symptoms of agrammatism, difficulties in reflecting regular verbs, difficulties producing and comprehending syntactically complex utterances, and possibly apraxia.

Adrover-Roig et al. (2011) conducted a study on a patient with damage to the basal ganglia and bilingual aphasia. The patient showed impaired L1 and relatively spared L2. The authors accounted for their findings by referring to a supplementary (more general executive) function of the basal ganglia, that is, serving as a controller/an inhibitor of competing processes. According to the authors (2011), their findings were in line with studies relying on the assumption that L1 is being executed more automatically – and hence associated to the procedural memory – and the processing of L2 mainly relies on retrieval from storage – and, hence, depends on the declarative memory. Adrover-Roig et al. (2011) elaborated on studies showing that loss of the general executive function of the basal ganglia can lead to frequent uncontrolled switching between L1 and L2.

Whether the basal ganglia serve more generalized executive functions or subserve specific grammatical rules has also been assessed by Longworth et al. (2005). In wanting to test whether the basal ganglia could be identified as having a crucial role in inflectional morphology of past tense verb-forms, the authors (2005) replicated Ullman et al.'s (1997) past tense elicitation test on a group of patients

[1] Not taking into account that retrieval of studies may be replicated when all three keywords are used simultaneously.

either suffering from Parkinson's disease, Huntington's disease or cerebrovascular damage including the basal ganglia (the latter group of patients had differently localized cortical lesions). Longworth et al. (2005) ran both a production task and a comprehension task. The results showed that the patients demonstrated no impairments in inflecting regular or novel verbs compared to irregular verbs. In all, both syntax and semantic processing were preserved in the patients. According to the authors, the results indicate that the specific task of inflectional morphology of past tense verb-forms is underpinned by neural networks involving cortical regions rather than the basal ganglia. In further studies – the authors (2005) suggest – the presence of both damaged basal ganglia and the impaired inflectional ability should be treated as parallel dissociated dysfunctions. Because the patients showed no difficulties executing automatic processes (e.g. correctly inflecting regular verbs), but they refrained from inflecting a target novel word and instead replaced it with correctly inflected, semantically appropriate words, the basal ganglia dysfunction is claimed to account for the impaired later inhibition of alternative competing representations of word forms.

In line with the two preceding studies, Macoir et al. (2010) suggested that the procedural memory – and, hence, the basal ganglia – serves an executive role in language processing. Executive functions ensure problem-solving and the maintenance of (co-operating) processes needed to reach the goal in a specific task (Macoir et al. 2010). With respect to language, executive functions are believed to include application of rules on components retrieved from the lexicon, that is, the cooperation between processes underpinned by both declarative and procedural systems. Macoir et al. (2010) departed from the assumption that automatic processes need less supplementary cognitive resources such as executive functions. To isolate the function of the procedural memory from contributing systems, the authors minimized the role of contributing executive functions by constructing tasks requiring automatized cognitive processing. Neuroimaging of a psychiatric patient under investigation showed atrophy in left anterior temporal lobe prominently involving the lateral sulcus. The patient showed mild agrammatism, that is, left out function words and grammatically bound morphemes and produced syntactically incomplete sentences. He showed procedural deficits contrary to preserved declarative memory. Comparing the patient's ability to inflect real regular verbs and adjectives on the one hand and novel verbs and adjectives on the other, he only showed salient impairments inflecting the novel words. One account of the findings was that processing of novel word inflection relies entirely on the procedural system (as no word is stored in the lexicon). Another interpretation was

that the results are accounted for by distorted executive functioning, which cannot then be recruited in the processing of the novel words (similar to non-verbal novel problem solving).

Matthews (2015) elaborated on a case involving a patient diagnosed with Parkinson's disease and procedural memory dysfunction. The patient showed hypophonia, hypomimia, left hand tremor, and difficulties in learning new skills. Like Ullman (2001a), Matthews (2015) emphasized Parkinson's disease and Huntington's disease as most frequently accompanied by procedural memory dysfunctions. The deficit emerges when brain lesions include the basal ganglia, the cerebellum, and the supplementary motor area, which are regions crucial in gaining new knowledge and formation of habits (Matthews 2015). Emphasizing the correlation between the memory systems of the brain, Matthews (2015) acknowledged the fact that different neurodegenerative pathologies and accompanied memory dysfunctions can contribute to the understanding of associated neural networks.

The following section outlines studies exploring associations between (sub)cortical structures, the declarative memory and linguistic profiles. Given the very small number of studies addressing all three keywords[2] (elicited by a search procedure in PubMed, section 4), the section departs from Matthews (2015) account of the declarative memory. By extension of this, two studies have been identified addressing the proposed associations.

4.2 The hippocampus-declarative memory connection and role in language processing

Considering the proposed associations between the hippocampus, the declarative memory system, and the mental lexicon, the predictions outlined in section 2 entail a linguistic profile implying prevalence of anomia and difficulties with irregular verbs, but relatively preserved ability to construct grammatical and syntactically complex utterances.

Matthews (2015) operated with the well-known subdivision of the declarative memory into the episodic and the semantic memory. The author emphasized that the temporal lobe including the hippocampus is crucial to memory. Episodic memory is claimed to be mostly dependent on medial temporal lobe including the hippocampus, and lesions to these structures or to structures

[2] Two studies, including a study by Ullman and Pullman (2015) departing from the D/P model and a polish study by Jodzio (1995). Neither study is further elaborated on.

densely connected hereto will cause episodic memory loss. According to Matthews (2015), both episodic memory and semantic memory have been shown to be left lateralized. Additionally, the author elaborated on studies showing activation in the left hippocampus and part of the basal ganglia in episodic memory tasks, as well as correspondence between size of the left hippocampus and performance on verbal tasks. Episodic memory dysfunction is evident in delayed verbal information recall, e.g. if the patient is shown a short list of words and is asked to recall it 5-10 minutes later (Matthews 2015).

Further, Matthews (2015) elaborated on a case where a patient is diagnosed with Alzheimer's due to atrophy in the temporal lobe and hippocampal structures and showed impaired verbal memory and naming. Regarding semantic memory, Matthews (2015) stated that it is subserved by more anterior and inferior regions of the left temporal lobe. A frequent symptom of semantic memory deficit is anomia and in severe cases loss of object knowledge. Also, symptoms of the semantic variant of PPA can be present. Another case reported on a patient found with atrophy in the anterior temporal lobe and diagnosed with semantic variant of PPA. The patient showed word-finding pauses and rare semantic paraphasias (replacing low frequent words with high frequent words). Additionally, the patient showed difficulties in naming and category fluency. Matthews (2015) claimed that both episodic and semantic memory dysfunction can be consequences of Alzheimer's disease. Further, semantic memory dysfunctions are seen in patients who have undergone temporal lobectomy due to non-treatable epilepsy. Episodic memory dysfunctions are additionally seen in patients suffering from hippocampal sclerosis (Matthews 2015).

In mesial temporal epilepsy, a frequent co-morbid pathology is hippocampal sclerosis encompassing the degeneration and loss of hippocampal neurons (Thom 2014). A possible treatment of the epileptic seizures is temporal lobectomy, though language alterations have been (divergently) detected due to the removal of tissue (Davies et al. 1998). To clarify language alteration pre- and postoperatively, Davies et al. (1998) investigated the ability of naming objects in patients who were about to undergo surgical removal of parts of the anterior temporal lobe and the entire hippocampus due to mesial temporal lobe epilepsy and hippocampal sclerosis (HS). All participating patients suffered from intractable epilepsy of the temporal lobe and were divided into two groups depending on the severity of HS – one group was characterized as having no or mild HS (that is, HS-) and the other group as having moderate or marked HS (that is, HS+). They were tested pre- and postoperatively in object naming tasks. The study showed that

preoperatively, HS+ patients were significantly worse in naming objects compared to HS- patients. Furthermore, postoperative test results showed a significantly larger decline in naming abilities in HS- patients compared to the HS+ patients. According to the authors, this greater loss of ability in the HS- patients in completing the naming tasks may be due to the removal and loss of a well functioning hippocampus; whereas in the HS+ patients, removal of a malfunctional hippocampus may have led to relatively little or no change.

A possible interpretation of the results is that the hippocampus and/or its connections could well be of importance in retrieving the intended words from the lexicon – and furthermore in posing a link to relevant cortical regions. In addition to the naming ability decline after removal of a mildly (compared to severely) affected hippocampus, Davies et al. (1998) elaborated on studies showing a relatively greater memory loss being in line with the relation between the hippocampus and the declarative memory. The authors (1998) argued that their results confirm that the memory loss especially holds for episodic verbal memory. Another possible explanation of the smaller decline of naming ability postoperatively in HS+ patients is the presence of reorganized cognitive functions. The authors argued that HS+ patients characterized by earlier onset of epileptic seizures (compared to HS+ patients with later onset of seizures) showed increased tendency of rearrangement of neural structures responsible for language processing. Processes underpinning language execution were then relatively preserved and not affected by the surgical operation.

Alamri (2017) claimed that language should be perceived as a cognitive function interconnected to other cognitive domains. Accordingly, Alamri (2017) argued that investigating language requires much broader attention to general neurobiology than claimed by the traditional view on Broca's and Wernicke's areas as isolated language domains. This is indicated by the existence of cases of fluent and non-fluent aphasia as consequences of lesions to brain structures other than the two cortical regions mentioned. Alamri (2017) emphasized that possible reorganization of cognition-responsible neural structures further implicates the assessment of how language is processed in the brain.

Alamri (2017) elaborated on a study by Liégeois et al. (2004) investigating language lateralization. The study included children with intractable epilepsy, half of them with lesions to or adjacent to Broca's area, the other half with lesions in the hippocampus or the temporal pole. Only the group of children with hippocampal lesions showed reorganized activated areas (that is, right lateralized) in language processing, indicating that the hippocampus may contribute to

language lateralization. In addition, Alamri (2017) suggested that the hippocampus may have a more specific role in language processing, supplementing the role of storing lexical items. Departing from the fact that humans constantly produce novel utterances based on creative and flexible use of language, Alamri (2017) noted that patients suffering from episodic memory dysfunction due to hippocampal lesions tend not to produce verbal plays compared to controls. Alamri (2017) suggested that it could be an indication of the hippocampus contributing to the creativity or flexibility in the online processing of language. Further, the author (2017) emphasized that the hippocampus serves as a pillar in 'relational binding' – that is, connecting distributed cognitive functions in the purpose of executing a specific task.

5. Discussion

The declarative/procedural model (e.g. Ullman et al. 1997) states that language processing relies on memory systems which are subserved by subcortical structures. This review aims at assessing whether the literature focusing on subcortical structures, memory systems, and aphasia supports the associations proposed by the declarative/procedural model. With the contributions of a linguistic theory on the grammar-lexicon divide (Boye & Harder 2012), predictions on the linguistic profiles of patients with damage to subcortical structures affecting the function of the memory systems are made. These include that damage to the hippocampus distorts the declarative memory system and consequently, patients will show with symptoms of fluent aphasia, that is, anomia (phonemic, semantic, and verbal paraphasias), difficulties when inflecting irregular verbs, and relatively preserved ability to construct grammatical sentences. Contrary, damage to the basal ganglia will affect the procedural memory system, and, linguistically, patients will show with symptoms like those present in non-fluent aphasia. That is, symptoms of agrammatism prominently affecting the inflection of regular verbs, difficulties in producing and comprehending syntactically complex utterances, and possibly apraxia. In the following section, the results are checked against these predictions.

Considering the association of the mental grammar, the procedural memory system, and the basal ganglia, findings of two studies deviate from the predictions. First, Macoir et al. (2010) found that a patient with a lesion near Broca's area, procedural deficits, and a linguistic profile similar to those of non-fluent aphasia had difficulties inflecting novel regular verbs and adjectives (compared to preserved ability of inflecting real regular verbs and adjectives). Additionally, the patient under investigation was tested in application of syntactical

rules having to construct canonical and non-canonical sentences. The patient succeeded in structuring both canonical and non-canonical sentences with two-argument verbs but failed when having to structure non-canonical sentences with a three-argument verb. The authors (2010) proposed that the patient's performance is due to impaired procedural computational ability of applying syntactic algorithms. Presuming that the lesion to a region near Broca's area caused the procedural deficit then the partly impaired ability to apply syntactical rules is in line with the predictions. Further, the authors (2010) proposed that instead of distinguishing between grammatical rules with regard to complexity they are better perceived as being applied hierarchically and successively in accordance with task progression.

Second, Longworth (2005) replicated the study conducted by Ullman et al. (1997) but found that patients with neurodegenerative disorders or cerebrovascular damage showed no relatively greater difficulties when inflecting regular verbs compared to irregular, or when inflecting regular real verbs compared to regular novel verbs. According to Longworth (2005), the automatized processing was left relatively preserved and cannot be ascribed to the functioning of the basal ganglia. Contrary, the basal ganglia were claimed rather to be responsible of the controlling of competing processes. The depreciation of the basal ganglia as underpinning automatic processing speaks against the predictions. However, the idea of the basal ganglia as being involved in controlling competing processes is compatible with the concept of existing neural structures being responsible of various cognitive functions.

Opposing the results of Longworth (2005), Adrover-Roig et al. (2011) found indication of an association between the procedural memory system and automatic processing in patients with bilingual aphasia. This association is also emphasized by Boye and Harder (2017) advocating that L1, and, hence, native mastery, relies more on subconscious automatized processing. Further, Matthews' (2015) reports are compatible with Ullman et al.'s (1997) predictions on a double dissociation between brain damages, cognitive functioning, and linguistic profiles.

Likewise, Matthews' (2015) findings on the association between pathologies causing declarative memory impairments and linguistic symptoms characterized by those of fluent aphasia coincide with the predictions. Patients show both semantic paraphasias and impairments in naming as well as category fluency. This is also in line with the findings done by Davies et al. (1998) indicating that the hippocampus and/or connected circuits are crucial in retrieving words from the mental lexicon. Additionally, the authors advocated the possibility of reorganization of cognitive functions which is also proposed by Boye and

Harder (2017) and Mogensen (2014). Unaffected brain regions taking over the functions of dysfunctional neural structures argues against the traditional idea of an innate, static, neuroanatomically localized language component. It is proposed that the neural structures underpinning language processing are highly interconnected. Especially Matthews (2015) and Alamri (2017) advocate this assumption. Further, Alamri (2017) suggested that the hippocampus – in addition to storing lexical items – may contribute to the online processing of language which has so far mainly been ascribed to the procedural memory system.

Furthermore, arguing against the traditional view of grammar and lexicon as completely separable components, none of the studies presented above proves this right. Ullman (2004) argued that the mental grammar and the mental lexicon interact in several ways, acknowledging that, in principle, transparent, compositional word forms and phrases could be stored in the mental lexicon without being dependent on computational processes of the procedural system when produced. Alike, Ullman (2004) highlighted a tendency observed in language: the preference for exceptional irregular forms over general compositional forms – that is, the preference for items stored in the mental lexicon rather than those computed by the mental grammar. This is in line with Boye and Harder (2017) proposing the idea of treating a regular complex word form as being both a result of computational processes and as a non-compositional stored item. Further supporting the proposals that the procedural memory system (and hence the mental grammar) interacts with the declarative memory system (and hence the mental lexicon), Boye and Harder (2017) mentioned the process of grammaticalization in which a lexical item diachronically develop into being a grammatical item (e.g. a previous lexical item developing into a productively used derivational affix).

6. Conclusions

When proposing a theory on potential mechanisms underpinning language processing, an understanding of how and whether neural structures interact in the brain and of the components constituting language is necessary. According to Ullman et al.'s (1997) declarative/procedural model, language processing is attributed to existing neural structures underpinning other well studied cognitive functions. Though, as indicated by an exhaustive search on the association between the memory systems and neural structures, the role of the hippocampus as subserving the declarative memory – and hence the mental lexicon – need further research. This is further confirmed by the findings of this review showing a

tendency towards more linguistically concrete investigations when exploring the role of the basal ganglia in procedural memory and mental grammar. According to Boye and Harder (2017), Ullman's model (e.g. 2001a) poses a link between a pure neurobiological theory on the organization of cognitive functions and a linguistic functional-cognitive theory on the grammar-lexicon divide. Further research on the associations between language processing and neural structures could beneficially be based on such integrating model.

References

Adrover-Roig, D., Galparsoro-Izagirre N., Marcotte, K., Ferré, P., Wilson, M. A. & Inés Ansaldo, A. (2011). Impaired L1 and executive control after left basal ganglia damage in a bilingual Basque-Spanish person with aphasia. *Clinical Linguistics and Phonetics, 25*, 480-498.

Alamri, S. (2017). *The contribution of the hippocampus to language processing*, PhD thesis, Universitat de Barcelona.

Bastiaanse, R. & Zonneveld, R. van (2005). Sentence production with verbs of alternating transitivity in agrammatic Broca's aphasia. *Journal of Neurolinguistics, 18,* 57-66.

Boye, K. & Harder, P. (2012). A usage-based theory of grammatical status and grammaticalization. *Language, 88*, 1-44.

Boye, K & Harder, P. (2017). Konstruktionsgrammatik, regler og funktionsbaseret struktur i neurokognitiv belysning. *Ny forskning i grammatik, 24*, 45-61.

Davies, K., Bell, B. D., Bush, A. J., Herman, B. P., Dohan, F. C. Jr. & Jaap, A. S. (1998). Naming decline after left anterior temporal lobectomy correlates with pathological status of resected hippocampus. *Epilepsia, 39*, 407-419.

Eichenbaum, H. & Cohen, N. J. (2004). *From conditioning to conscious recollection: Memory systems of the brain*. Oxford: Oxford University Press.

Liégeois, F., Connelly, A., Cross, J. H., Boyd, S. G., Gadian, D., Vargha-Khadem, F. & Baldeweg, T. (2004). Language reorganization in children with early-onset lesions of the left hemisphere: an fMRI study. *Brain, 127*, 1229-1236.

Longworth, C. E., Keenan, S. E., Barker, R. A., Marslen-Wilson, W. D. & Tyler, L. K. (2005). The basal ganglia rule-governed language use: evidence from vascular and degenerative conditions. *Brain, 128,* 584-596.

Macoir, J., Fossard, M., Nespoulous, J.-L., Demonet, J.-F. & Bachoud-Lévi, A.-C. (2010). The application of rules in morphology, syntax and number processing: A case of selective deficit of procedural or executive mechanisms? *Neurocase, 16,* 358-376.

Matthews, B. R. (2015). Memory dysfunction. *Continuum, 21*, 613-626.

Mogensen, J. (2014). Reorganization of Elementary Functions (REF) after Brain Injury and in the Intact Brain. *Horizons in Neuroscience Research, 15*, 99-140.

Thom, M. (2014). Review: Hippocampal sclerosis in epilepsy: a neuropathologic review. *Neuropathology and Applied Neurobiology, 40*, 520-543.

Ullman, M. T.; Corkin, S., Coppola, M., Hickok, G., Growdon, J. H., Koroshetz, W. J. & Pinker, S. (1997). A neural dissociation within language: Evidence that the mental dictionary is part of the declarative memory, and that grammatical rules are processed by the procedural system. *Journal of Cognitive Neuroscience, 9*, 266-276.

Ullman, M. T. (2001a). A neurocognitive perspective on language: The declarative/procedural model. *Neuroscience, 2*, 717-726.

Ullman, M. T. (2001b). The declarative/procedural model of lexicon and grammar. *Journal of Psycholinguistic Reasearch, 30*, 37-69.

Ullman, M. T. (2004). Contributions of memory circuits to language: the declarative/procedural model. *Cognition, 92*, 231-270.

Ullman, M. T. (2006). Is Broca's area part of a basal ganglia thalamocortical circuit? *Cortex, 42*, 480-485.

Ullman, M. T. (2016). The declarative/procedural model: A neurobiological model of language learning, knowledge, and use. In G. Hickok & S Small (Eds.), *Neurobiology of Language* (pp. 953-968). London: Elsevier.

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