UNIVERSITY OF NOVI SAD

FACULTY OF PHILOSOPHY

THE ACQUISITION OF *SE*-VERBS IN SERBIAN AS L1

PHD DISSERTATION

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Резиме на језику рада:	Студије које се баве усвајањем матерњег језика нам пружају увид у начин на који деца перципирају однос између екстралингвистичке ситуације/активности/догађаја и учесника у датој ситуацији/активности/догађају, као и у начин на који га вербализују као однос између глагола и његових аргумената на језичком нивоу. То преношење на језички ниво нас информише о току усвајања језика. Како глаголи заузимају централну позицију у клаузи, изучавање аргументске структуре се већ годинама налази у фокусу психолингвистичких истраживања. Постојеће студије показују да се повратни глаголи усвајају прилично рано (Snyder–Hyams, & Crisma, 1995; Snyder–Hyams, 2015). Ипак, нека истраживања су дошла до закључка да деца имају потешкоћа са померањем унутрашњег аргумента на положај субјекта (енгл. A-chain Deficit Hypothesis; Borer–Wexler, 1987; Babyonyshev–Fein–Ganger–Pesetsky, & Wexler, 2001), док резултати других експеримената указују на проблем са усвајањем глагола које карактерише алтернирајућа транзитивност (глагола који могу бити и транзитивни и интранзитивни) (Brooks–Tomasello, 1999). Циљ ове дисертације је био да испита успех деце у продукцији различитих врста глагола који се јављају са клитиком *се*: правих повратних глагола (нпр. *облачити се*), лексички повратних глагола (нпр. *пењати се*), узајамно-повратних глагола (нпр. *грлити се*), лексички узајамно-повратних глагола (нпр. *свађати се*) и анти-

[1] Аутор докторске дисертације потписао је и приложио следеће Обрасце:
5б – Изјава о ауторству;
5в – Изјава о истоветности штампане и електронске верзије и о личним подацима;
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Ове Изјаве се чувају на факултету у штампаном и електронском облику и не кориче се са тезом.

	каузативних глагола (нпр. *поломити се*). Ниједан од ових типова глагола није синтаксички једноставан, пошто ни код једног није присутно каноничко повезивање тематских улога агенса и пацијенса са синтаксичким функцијама субјекта и објекта. Ипак, иницијална хипотеза је била да се прави повратни глаголи усвајају пре узајамно-повратних и анти-каузативних глагола, јер се код њих две тематске улоге (агенса и пацијенса), реализоване у виду кореференцијалних аргумената, пресликавају на функцију субјекта на нивоу синтаксе. Код узајамно-повратних глагола су присутна два некореференцијална аргумента, која истовремено обављају и функцију субјекта и функцију објекта, док анти-каузативне глаголе карактерише синтаксички комплексан процес деривације из транзитивног глагола, уз брисање спољашњег аргумента. Други циљ ове тезе је било поређење морфосинтаксички изведених (правих) облика и лексичких облика повратних и узајамно повратних глагола. Лексички повратни и узајамно-повратни глаголи нису заменљиви транзитивним глаголима, као што је то случај са правим повратним и узајамно-повратним глаголима, што би могло да допринесе њиховој успешнијој продукцији. Напослетку, размотрили смо какве последице резултати истраживања имају на опис статуса и функције клитике *се* у српском језику. Након спровођења пилот истраживања, чија је сврха била да се провери како деца реагују на стимулусе, и у складу с тим изврше неопходне корекције, деца су први пут тестирана у фебруару 2019. године, а затим изнова девет месеци касније. У оба експеримента је учествовало укупно 60 испитаника из 3 старосне групе (од отприлике три, четири и пет година старости – по 20 испитаника у свакој). Техника прикупљања података је била задатак елицитиране продукције уз коришћење унапред припремљених визуелних стимулуса (цртежа), а од деце се тражило да именују наведене радње. Број тестираних глагола из сваке групе је био једнак (шест глагола по групи, укупно тридесет циљних глагола). Подаци су статистички обрађени анализом из породице Мешовитих линеарних модела. У првом делу истраживања, испитано је који се од пет врста глагола продукују са већим успехом од осталих у свакој од три старосне групе. У другом делу истраживања, тестиран је пораст у продукцији појединачних врста глагола у три старосне групе. Независне варијабле у истраживању су биле врста глагола и узраст деце. Зависна варијабла је била продукција циљних одговора по типовима глагола (унутар старосне групе и између старосних група). Дужина и фреквенција глагола су такође тестиране као коваријабле. Резултати добијени у првом експерименту су показали да деца најтачније продукују лексички повратне глаголе, те праве повратне глаголе. С друге стране, чини се да продукција правих узајамно-повратних, лексички узајамно-повратних, као и анти-каузативних глагола касни, што је и било очекивано, с обзиром на већу комплексност ових глагола. Исти експеримент је поновљен у децембру 2019. Резултати су потврдили претходне закључке, иако је продукција свих врста глагола била много успешнија, укључујући и оне који су се показали тешким, што је резултовало тиме да неке разлике у продукцији различитих типова глагола унутар, као и између старосних група, више нису биле присутне. Опште узевши, резултати истраживања указују на то да се повратни глаголи усвајају пре узајамно-повратних и анти-каузативних глагола, што потврђује иницијалну хипотезу. Када је реч о статусу клитике *се*, резултати ове студије су у складу са претходним истраживањима (Ивић, 1961–1962; Piper et al., 2005; Arsenijević, 2011; Reinhart–Siloni, 2003), што нас доводи до закључка да клитика *се* и повратна заменица *себе* имају различиту дистрибуцију у језичкој продукцији глагола са клитиком *се*, те се стога предлаже да би клитику *се* пре требало третирати као одвојену морфему, него као скраћени облик повратне заменице.

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	canonical linking of semantic roles and syntactic functions. However, it was expected that reflexive verbs would be produced more accurately than reciprocal and anti-causative verbs since they are less complex (both the Agent and the Patient theta-role is mapped onto the subject). Reciprocal verbs involve two non-coreferential arguments that are both agents and patients, whereas anti-causative verbs involve a complex syntactic process of derivation from a transitive verb (including elimination of an external +cause theta-role). Furthermore, we wanted to establish whether lexicality played an important role in producing reflexive and reciprocal verbs. Lexical reflexive and reciprocal verbs are not interchangeable with transitive verbs, as is the case with true reflexive and reciprocal verbs, which could contribute to their more successful production. Finally, children's non-target answers were analysed in order to determine the implications of this research for the analysis of the status and functions of the clitic *se* in Serbian. After conducting a pilot study in order to check the validity of the experiment, the children were first tested in February 2019, and again nine months later (follow-up). A total of sixty subjects belonging to three age groups (roughly 3-year-olds, 4-year-olds and 5-year-olds – twenty participants in each group) took part in both experiments. The data collection technique was a verb elicitation task. Target verbs were elicited by means of visual stimuli (drawings). 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 verb type, thirty target verbs in total). The data were analysed with the Mixed Effects Logistic Regression (GLMER). In the first part of the research, specific contrasts between verb types were pre-coded, so that we could check which verb types were produced with greater success within each of the age groups. In the second part of the research, the increase in the production of each verb type across the three age groups was tested. The dependent variable was verb production coded as target or non-target, and the independent variables were verb type and age. Verb length and frequency effects were also examined, as co-variables. The results of the first experiment indicate that the production of lexical reflexive verbs is most accurate, followed by true reflexive verbs. On the other hand, the production of true reciprocal, lexical reciprocal and anti-causative verbs seems to lag behind, which was expected, due to their greater complexity. The same experiment was repeated in December 2019. The results confirm previous findings, although the overall production of all verb types, including the more complex ones, was much more successful, which resulted in finding fewer differences in production within and between the age groups. Overall, the results indicate that reflexive verbs are acquired before reciprocal and anti-causative verbs, which confirms the initial hypothesis. Regarding the status of the clitic *se*, the results obtained in this study support the findings of previous research (Ivić, 1961–1962; Piper et al., 2005; Arsenijević, 2011; Reinhart–Siloni, 2003) and lead us to conclude that the clitic *se* and the reflexive pronoun *sebe* 'self' have different distribution in the production of *se*-verbs and therefore, the clitic *se* should be treated as a morpheme in its own right rather than as the shortened form of the reflexive pronoun.
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Any errors or oversights are mine alone.

Novi Sad,

April 2021

Abbreviations

Language acquisition	LA
Verb phrase	VP
Tense phrase	TP
Verb	V
Specifier	spec
Universal Grammar	UG
the A-chain Deficit Hypothesis	the ACDH
the External Argument Requirement Hypothesis	the EARH
First language	L1
Second language	L2

Table of Contents

1. INTRODUCTION

1. 1. Introductory remarks

The question of verb acquisition is one of the most fundamental questions in the study of first language acquisition (LA). To become competent speakers of their mother tongue, children must learn how to generalise and constrain their use of verbs belonging to different verb types. That is the reason why the acquisition of the argument structure of verbs within the process of LA has fascinated linguists for years. They have attempted to explain the children's ability to acquire different verb types in a very short period and predict difficulty based on syntactic and semantic complexity of certain verbs. Although they appear the same in their surface form, Serbian *se*-verbs entail a wide range of verbs belonging to different types. That is the main reason for the exploration of these verbs in the present thesis.

According to Pinker (1989: 5), "how argument structures are acquired is intertwined with the question of why particular verbs are paired with particular argument structures". Therefore, the study of the acquisition of *se*-verbs in Serbian is important "not only for gaining an insight into the way children acquire argument structure, but also for a better understanding of the nature of these verbs" (Ilić, 2020a: 76). Verbs which appear with the clitic *se* in Serbian have been "particularly interesting for syntacticians because the status of the clitic *se* has not been fully defined yet" (Ilić, 2019: 94). While some linguists claim it is merely a short form of the reflexive pronoun *sebe* (Piper, 1984–1985; Stanojčić–Popović, 2002), others treat it as a morpheme (Ivić, 1961–1962; Piper et al., 2005; Arsenijević, 2011; Reinhart–Siloni, 2003). Furthermore, *se*-verbs are used in a variety of syntactic conditions. The present research into the acquisition of *se*-verbs in Serbian is expected to add to our understanding of the acquisition of verbs with different argument structures because it tests the production of *se*-verbs of varying syntactic and semantic complexity at different stages of LA and at two points in time, allowing us to compare the production of various *se*-verbs

transversally, as well as longitudinally. Gaining an insight into the way children acquire different *se*-constructions can also contribute to solving the problem of defining the lexical-syntactic status of the clitic *se* in Serbian.

1.2. The aims of the thesis

The first aim of the present research was to examine the order in which different *se*-verbs are acquired in Serbian. The first research question was which *se*-verbs are produced better at different stages of first LA in Serbian. It was answered by testing the production of five types of *se*-verbs: true reflexive verbs, lexical reflexives, true reciprocals, lexical reciprocals and anti-causative verbs, at two points in time. None of the tested types is syntactically simple, because none of them involves canonical linking of semantic roles and syntactic functions (Agent–subject and Patient–object). However, the initial hypothesis was that true reflexive verbs would be produced with greater success than reciprocal and anti-causative verbs at earlier stages of LA because they are syntactically and semantically less complex. This prediction proved true in previous research into the acquisition of *se*-verbs in Croatian as L2 (second language) (Pavlinušić–Kelić, 2001). Pavlinušić–Kelić (2001) came to the conclusion that linguistic structures that reflect prototypical semantic concepts are the first to be acquired. True reflexive verbs assign two theta-roles[3] – Agent and Patient – both of which are mapped onto the subject. The internal theta-role of the verb (Patient) cannot be assigned to its canonical position due to the presence of the clitic *se*, which reduces the case. It remains unassigned until the external argument is merged, after which bundling takes place, i.e. two theta-roles are assigned to the same argument (Reinhart–Siloni, 2003). On the other hand, reciprocal verbs involve two non-coreferential arguments that are both Agents and Patients at the same time, whereas anti-causative verbs involve a complex syntactic process of

[3] Theta-roles express semantic relations between an activity/situation/event (denoted by the verb) and the participants in that activity/situation/event (denoted by the obligatory arguments). The number of arguments that a verb takes (valency) depends on the number of thematic-roles (θ-role) that the verb assigns (Chomsky, 1981).

derivation from a transitive verb (including elimination of an external +Cause theta-role, see Section 2.1.2.).

The second aim of the research was to compare the production of true (morpho-syntactically derived) and lexical forms of reflexive and reciprocal verbs. The second research question was whether lexicality plays an important factor in the production of reflexive or reciprocal verbs. Lexical reflexive and reciprocal verbs are not intercheangable with transitive verbs, as is the case with true reflexive and reciprocal verbs, which could contribute to their more successful production.

The final aim of the thesis was to analyse the varying success in the production of different types of *se*-verbs and the children's non-target answers in order to determine the implications of this research for the status and functions of the clitic *se* in Serbian.

The results of the present study will be interpreted in the light of both the generative (Pinker, 1984, 1989; Gleitman, 1990; Snyder–Hyams, & Crisma, 1995; Lorusso–Caprin, & Guasti, 2005; Costa–Friedmann, 2012; Snyder–Hyams, 2015; Borer–Wexler, 1987; Babyonyshev–Fein–Ganger–Pesetsky, & Wexler, 2001) and the usage-based learning approach (Bowerman, 1991; Tomasello, 1999, 2003; Brooks–Tomasello, 1999; Lieven–Pine, & Baldwin, 1997, Lieven, 2008, Anđelković, 2012) to LA. A suggestion for the lexical-syntactic status of the clitic *se* will be provided as well.

1.3. Thesis structure

The thesis is organised as follows. After an introduction provided in Chapter 1, Chapter 2 presents the theoretical background. The first section covers three approaches to *se*-verbs: traditional, generative, and lexical-functional, which is followed by a classification of *se*-verbs respecting their syntactic and semantic complexity and prototypicality. An outline of the hypothesis about the innateness of semantic roles is provided in the second section of

Chapter 2, followed by an overview of studies that speak in favour of the Maturation Hypothesis and the Continuity Hypothesis. The fundamental ideas of the usage-based approach to LA are described next. The third section of Chapter 2 provides an overview of studies that looked into the acquisition of *se*-verbs, followed by a review of studies that looked into the acquisition of verbs in Serbian (fourth section).

After presenting the theoretical background, Chapter 3 gives a detailed description of the methodology used in this research, together with the analysis and discussion of the results obtained in the pilot research. Necessary improvements are discussed as well. Chapter 4 presents the methodology and findings of the main experiment, whereas Chapter 5 presents the methodology and results of the follow-up experiment, conducted after a nine-month period. The results involve the analyses of the production of different *se*-verbs in the groups of three-year-olds, four-year-olds and five-year-olds, as well as the analyses of the increase in the production of separate verb types across the tested groups. Moreover, the results sections provide a qualitative analysis of the children's non-target answers. Finally, in Chapter 6, we discuss the observed tendencies, implications for the theory, and limitations of the research, followed by a conclusion in Chapter 7.

2. THEORETICAL BACKGROUND

2.1. Verbs with the clitic *se* in Serbian

2.1.1. Traditional approach to *se*-verbs

The clitic *se* is considered an indicator of reflexivity in traditional Serbian grammars, although it is used in a variety of syntactic conditions. In other words, 'reflexive verb' is an umbrella term for all the *se*-verbs in Serbian (Ilić, 2020a). Nevertheless, the reason for using this term should not be searched for in the nature of these verbs, but in the Serbian linguistic tradition, as suggested by Serbian linguists (Stevanović, 1954; Ivić, 1961–62; Arsenijević, 2011). The clitic *se* is the only unifying element of these verbs, although no consensus on its lexical-syntactic status has been reached yet (Ilić, 2020a). It is treated it in different ways: as the short form of the reflexive pronoun *sebe* 'self' (Piper, 1984–1985; Stanojčić–Popović, 2002), as a particle (Hlebec, 1996) or a pronoun-particle (Stevanović, 1979), as a morpheme (Ivić, 1961–1962; Piper et al., 2005; Arsenijević, 2011) or even as an element (Milošević, 1973).

According to the most widely accepted classification, Serbian *se*-verbs can be divided into true reflexives, quasi reflexives, and reciprocal reflexive verbs (Stanojčić–Popović, 2002). Activities which the Agent performs on himself/herself are denoted by true reflexive verbs. When it appears with this type of *se*-verbs, the clitic *se* is interpreted as the accusative case of the reflexive pronoun *sebe* 'self' (e.g. *češljati se* 'comb oneself'). However, activities denoted by quasi reflexive verbs cannot be interpreted as activities which the Agent preforms on himself/herself, and thus, the clitic *se* cannot be interpreted as the accusative case of the reflexive pronoun *sebe* 'self' either (e.g. *nadati se* 'hope'). The function of the reflexive particle *se*, as Stanojčić–Popović (2002) refer to it in this case, is not defined. Finally, activities in which the Agents perform activities on each other (e.g. *tući se* 'fight with each other') are denoted by reciprocal reflexive verbs. Stanojčić–Popović (2002) do not mention

other types of *se*-verbs (middles, impersonals, anti-causative verbs, etc.) in their classification. Traditional Croatian grammars offer classifications which are either the same (Barić et al., 1995), or easily comparable, with some additional categories such as 'miscellaneous reflexive verbs' (Grubišić, 2007).

The above classification is not based on a unique criterion, as noted by Samardžić (2006). The first group of verbs is defined based on the meaning and interpretation of the clitic *se*, which is not the case with the second and third group. With quasi reflexive verbs, its interpretation is defined negatively. With reciprocal reflexive verbs, there is no reference to the clitic *se*.

There are tests that show differences in both the syntax and semantics of the reflexive pronoun *sebe* 'self' and the clitic *se*. The first group of tests demonstrates the different syntactic distribution of the two forms, namely the difference between a reflexive construction and a reflexive verb. The predicative attribute test (Medová, 2009; Oraić Rabušić, 2015) illustrated in (1) shows that the predicative attribute *celog* 'whole' modifying the personal pronoun *ga* 'him' (1a) and the predicative attribute *celu* 'whole' modifying the reflexive pronoun *sebe* 'self' (1b) both appear in the accusative case, whereas the predicative attribute *cela* 'whole', which is used with the clitic *se*, appears in the nominative case (1b).

1. a. Ona je Marka obrisala celog. Ona *ga* je obrisala *celog*. (Ilić, 2020b: 428)
   she.nom Marko.acc wipe.3sg.past whole.acc she.nom him wipe.3sg.past whole.acc
   'She wiped Marko/him all over.'
   b. Ona je *sebe* obrisala *celu*. Ona *se* obrisala *cela*. (Ilić, 2020b: 428)
   she.nom herself.acc wipe.3sg.past whole.acc she.nom SE wipe.3sg.past whole.nom
   'She wiped herself all over.'

Similarly, the test of modification with the *kao*-phrase (Moskovljević, 1997; Medová, 2009; Oraić Rabušić, 2015) used in (2) shows different syntactic manifestations of the two forms.

The phrase *kao prava zvezda* ‘like a real star’ is in the nominative case when it appears with the clitic *se* (2a), whereas it is in the accusative case when it modifies the reflexive pronoun *sebe* ‘self’ (2b).

2. a. Ona *se* našminkala kao *prava zvezda*/*pravu zvezdu. (Ilić, 2020b: 428)
   she.nom SE put on makeup.3sg.past like real star.nom/*real star.acc
   ‘She put on makeup like a real star.’
   b. Ona je *sebe* našminkala kao *pravu zvezdu*. (Ilić, 2020b: 428)
   she.nom self.acc put on makeup.3sg.past like real star.acc
   ‘She did her makeup to look like a real star.’
   c. Ona je *sebe* našminkala kao *prava zvezda*. (Ilić, 2020b: 428)
   she.nom self.acc put on makeup.3sg.past like real star.nom
   ‘She put on makeup like a real star.’

It should be pointed out that (2c) is also a grammatical sentence in Serbian, although the *kao*-phrase is in the nominative case. This is because the *kao*-phrase in (2c) is an adverbial phrase specifying the way in which the subject is performing an activity, whereas the *kao*-phrase in (2b) modifies the object, which is why the accusative case is needed. If we use a masculine object in the same example, the explained difference is easily observed (3). The *kao*-phrase in (3a) modifies *Marko*, as the object of the clause, specifying the way he looked, whereas the *kao*-phrase in (3b) does not give any additional information about the object, but about the way in which the subject performed the activity of putting on makeup.

3. a. Ona je Marka našminkala kao pravu zvezdu. (Ilić, 2020b: 428)
   she.nom Marko.acc put on make up.3sg.past like real star.acc
   ‘She did Marko’s makeup to look like a real star.’

b. Ona je Marka našminkala kao prava zvezda. (Ilić, 2020b: 428)

she.nom Marko.acc put on makeup.3sg.past like real star.nom

'She did Marko's makeup like a real star.'

Apart from the differences in the syntactic distribution, semantic differences between the two forms have been noted as well (Moskovljević, 1997; Arsenijević, 2011). Arsenijević (2011: 120) notices the semantic difference between the construction *fotografisati sebe* 'take a photo of oneself', as opposed to the reflexive verb *fotografisati se* 'have one's photo taken'.[4] In the former, the subject is the Agent who performs the activity on himself/herself, whereas in the latter that activity may be performed by a different Agent.

There have also been many attempts to show that the clitic *se* should not be taken as an object clitic (Reinhart–Siloni, 2003; Marelj, 2004; Samardžić, 2006). These will be discussed in detail in the next section.

2.1.2. Generative approach to *se*-verbs

Arity operations are universal derivational operations which affect verb valency. It is by means of these operations (which can apply in both lexicon and syntax) that different variations of the same thematic concept are derived, as Reinhart–Siloni (2003) claim. According to the authors, both reflexivisation and reciprocalisation apply in syntax in Serbo-Croatian. Reinhart–Siloni (2003) explain how the clitic *se* appears whenever the syntactic valency of the verb is reduced, claiming that the clitic is actually a morphological component of the verb which reduces the accusative case. The internal theta-role of the verb cannot be assigned to its canonical position (the sister of V) in the presence of the clitic *se*. Thus, it remains unassigned until the external argument is merged. After the external argument has been merged, bundling takes place, i.e. two theta-roles are assigned to the same argument. As

[4] This is the closest translation equivalent in English. However, to *have one's photo taken* implies that the Agent is someone else, whereas in Serbian the Agent may or may not be a different person.

cited in Ilić (2020a: 78), that is how Reinhart–Siloni (2003) explain the possibility of the subject bearing both the Agent and Patient theta-role at the same time, which happens with reflexive verbs. Siloni (2008) claims that reciprocalisation also prevents the assignment of the internal theta-role due to the lack of case. The internal theta-role gets associated with the external theta-role, which results in forming a reciprocal meaning.

Moreover, whereas traditional classifications of *se*-verbs in Serbian do not provide any account of anti-causative verbs, this type of *se*-verbs is included in Reinhart–Siloni's theory. As cited in Ilić (2016: 116), theta-roles are decomposed using formal primitives, i.e. two binary features: +/- c (cause change) and +/- m (mental state) proposed in Reinhart's system (2000, 2002). All the theta-roles are defined as clusters of those features: Agent [+c, +m]; Instrument [+c, -m]; Experiencer [-c, +m]; Theme [-c, -m]; Cause [+c]; Recipient/Goal/Benefactor [-c]; Subject Matter/Source [-m]; Sentient[5] [+m]. Some theta-roles are specified for only one of the two features (e.g. Cause [+c]). The underspecified feature can be assigned + or – value, or it can be completely absent. Only the verbs whose external argument bears [+c] feature can give anti-causative verbs.

Reinhart–Siloni (2005: 416) define decausativisation (turning a transitive into an anti-causative verb) as the "reduction of an external [+c] role". In this process, 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 as the sister of V, it moves to a higher position, that of the specifier of TP (tense phrase), to become the subject. This approach is also adopted by Oraić Rabušić (2017) in her description of anti-causative verbs in Croatian.

Building on Reinhart–Siloni's (2003) theory, Marelj (2004) states that all *se*-verbs (reflexives, unaccusatives, middles, passives, impersonals, frozen *se*-constructions) are derived via arity operations. Marelj (2004) claims that the clitic *se* is the nominative or

[5] Reinhart (2002) introduces the Sentient theta-role to refer to the subjects of verbs like *love or know*, which are always merged externally, as opposed to standard experiencers, which may have different realizations. They require animacy, but they do not require a causal element.

accusative case absorber, even in "frozen" constructions, which do not have a synchronic transitive variation (e.g. *desiti se* 'happen'). Marelj (2004) suggests that they are diachronically derived outputs.

Samardžić (2006) also depicts the process of detransitivisation with *se*-constructions. By analysing alternations in the argument structure of ditransitive verbs, Samardžić (2006) provides further support for the claim that the function of the clitic *se* is to reduce the case. She shows that the clitic *se* is conditioned on the disappearance of the nominative-accusative opposition from a syntactic representation. A similar conclusion was also reached by Moskovljević (1997: 122), who states that reflexivisation appears as a result of the process of detransitivisation, while Arsenijević (2011: 122) claims that the morpheme *se* is a sign of syntactic intransitivity.

Reciprocal verbs have been claimed to possess more agentive properties than reflexive verbs. For instance, while reflexive verbs in Hungarian show features of both unaccusativity and unergativity, because the subject of a reflexive verb can be a Patient under certain conditions, reciprocals behave more like unergatives, since their subject is always an Agent. Their second argument acts as a "secondary Agent" (Rákosi, 2008). Moreover, Siloni (2008) uses several tests in Hebrew, French, Italian and Russian to prove that reciprocal verbs are unergative. According to Siloni, "reciprocalization is a universal operation that associates two roles with one – external – argument…" (Siloni, 2008: 461). This idea is also adopted within the lexical-functional approach, which will be discussed next.

2.1.3. Lexical-functional approach to *se*-verbs

The framework of Lexical-Functional Grammar has offered various accounts of reflexive constructions. Analysing examples from German and Romance, De Alencar–Kelling (2005) argue in favour of the transitivity hypothesis. They aim to show that reflexive clitics are

reflexive pronouns. However, there have been many attempts to prove the contrary (see Grimshaw (1982) for the French reflexive clitic; Alsina (1996) for Romance clitics; Patejuk–Przepiórkowski (2015) for the Polish word się). Following Alsina (1996), Miličević (2015) provides a non-reductionist analysis of reflexive verbs in Serbian, which assumes that both the external and the internal argument are retained in the structure of a reflexive/reciprocal verb.

Taking into account three levels of the analysis of the verb argument structure (thematic structure, argument structure and grammatical functions) defined by Ackerman–Moore (2001), Miličević (2015) proposes that there is a continuum of reflexive and reciprocal verbs. She claims that some *se*-verbs (inherently reflexive) are closer to unaccusative verbs, whereas others (inherently reciprocal) are closer to unergative verbs. The idea of a reflexive continuum can be found with authors working in the cognitive domain as well (Kemmer, 1993).

The continuum from reflexivity to unaccusativity commences with true reflexive verbs[6], or morpho-syntactically derived reflexive forms (e.g. *obući se* 'dress'), as Miličević (2015) refers to them. As illustrated in (4), the Agent and Patient theta-roles are realized as coindexed arguments. They perform the grammatical function of the subject together. On the other hand, the Agent argument is not realized in lexical reflexive verbs (e.g. *okrenuti se* 'turn around') despite being present in their thematic structure (since there are transitive variations in which arguments are realized as the subject and object at the level of syntax). Instead, only the Patient performs the function of the subject at the level of syntax. Finally, some reflexive verbs (e.g. *pojaviti se* 'appear'), are closer to unaccusatives than to morpho-syntactically derived reflexive verbs, since a transitive alternation is not available in the contemporary language (the proto-Agent is not present in their thematic structure, as it is the case with other

[6] For a different account of true reflexive verbs see Sportiche (2010).

lexical reflexive verbs). These are completely lexicalised reflexive verbs. At the very end of this continuum, we find underived unaccusative verbs (e.g. *stići* 'arrive'; for more details see Miličević, 2015).

4.	*obući se*		*okrenuti se*		*pojaviti se*	*stići*
	'dress'		'turn around'		'appear'	'arrive'
	[P-A]	[P-P]	[P-A]	[P-P]	[P-P]	[P-P]
	↓	↓		↓	↓	↓
	<$Arg1_1$	$Arg2_1$>	<	$Arg2_1$>	<$Arg1_1$>	<$Arg1_1$>
	↓	↓		↓	↓	↓
	$SUBJ_1$			$SUBJ_1$	$SUBJ_1$	$SUBJ_1$

(adapted from Miličević, 2015: 187)

Similarly, the continuum from reciprocality to unergativity commences with true reciprocal verbs, or morpho-syntactically derived reciprocal forms (e.g. *voleti se* 'love each other'), as Miličević (2015) refers to them. As illustrated in (5), the Agent and Patient theta-roles are both present in their argument structure, and perform the function of the subject together. On the other hand, the Patient argument is not realized in lexical reciprocal verbs (e.g. *čuti se* 'talk on the phone'), despite being present in their thematic structure (since there are transitive variations in which arguments are realized as the subject and object at the level of syntax). Instead, only the Agent performs the function of the subject at the level of syntax. Finally, some reciprocal verbs (e.g. *takmičiti se* 'compete'), are closer to unergatives than to morpho-syntactically derived reciprocal verbs, since a transitive alternation is not available in the contemporary language (the proto-Patient is not present in their thematic structure, as it is the case with other lexical reciprocal verbs). These are completely lexicalised reciprocal verbs. The arguments in question are no longer the Agent and Patient, but co-Agents.

Underived unergative verbs come at the very end of this continuum (e.g. *ratovati* ‘wage war’).

5.

voleti se		*čuti se*		*takmičiti se*	*ratovati*
‘love each other’		‘talk on the phone’		‘compete’	‘wage war’
[P-A]	[P-P]	[P-A]	[P-P]	[P-A]	[P-A]
↓	↓	↓		↓	↓
<$Arg1_1$	$Arg2_1$>	< $Arg1_1$	>	<$Arg1_1$>	<$Arg1_1$>
↓	↓	↓		↓	↓
$SUBJ_1$		$SUBJ_1$		$SUBJ_1$	$SUBJ_1$

(adapted from Miličević, 2015: 190)

Taking into account all the three approaches described, it is clear that the level of syntactic and semantic complexity of *se*-verbs varies. In the next section, each type that was tested in the experiment will be illustrated and defined in terms of its prototypicality.

2.1.4. Prototypicality of types of *se*-verbs

The notion of prototypical transitivity involves a volitional animate Agent affecting the state of an inanimate Patient (Hopper–Thomson, 1980). These thematic roles are typically linked to the syntactic functions of subject and object, according to the Thematic Hierarchy (Jackendoff, 1990). True reflexive verbs are the only type of Serbian *se*-verbs that mirror prototypical transitivity relation, due to the fact that there is a volitional animate Agent who affects the state of a Patient. However, the Patient is animate and coreferential with the subject (Ilić, 2020a: 78). Both theta-roles are mapped onto the subject and the argument is merged in the position of the external argument. The clitic *se* can be used instead of the reflexive pronoun *sebe* ‘self’ without any difference in meaning, as shown in (6):

6. a. Dečak se umiva.

   boy.nom SE wash face.3sg.pres

   'The boy is washing his face.'

   b. Dečak umiva sebe.

   boy.nom wash face.3sg.pres self.acc

   'The boy is washing his face.'

As far as true reciprocal verbs are concerned, the situation becomes semantically more complex, since there are two Agents who have an effect on the state of an animate Patient, and who are the Patients themselves simultaneously. Both theta-roles are associated with the external argument. The clitic *se* is interchangeable with the reciprocal *jedan drugog* 'each other', as exemplified in (7).

7. a. Dečak i devojčica se grle.

   boy.nom and girl.nom SE hug.3pl.pres

   'The boy and the girl are hugging.'

   b. Dečak i devojčica grle jedan drugog.

   boy.nom and girl.nom hug.3pl.pres each other

   'The boy and the girl are hugging each other.'

Lexical reflexive and reciprocal verbs are less prototypical because, as stated before, one of the theta-roles may not be assigned (the Agent theta-role is sometimes not assigned with lexical reflexive verbs, and the Patient theta-role is not assigned with lexical reciprocal verbs). Furthermore, the clitic *se* cannot be replaced with the reflexive pronoun *sebe* 'self' in the case of lexical reflexive verbs, nor can it be replaced with the reciprocal *each other* 'jedan drugog' in the case of lexical reciprocal verbs.

Lastly, anti-causative verbs are the least prototypical and the most syntactically and semantically complex type of the tested *se*-verbs (Ilić 2020a: 79). T his is due to the fact that

the argument that is assigned the Patient theta-role, which is prototypically mapped onto the syntactic function of object (8a), moves to the position of the specifier of TP in order to become the subject of the sentence, after an external +cause theta-role has been eliminated (8b). In addition to the Cause theta-role [+c], both the Agent theta-role [+c, +m] and the Instrument theta-role [+c, -m] bear this feature.

8. a. Marko je otvorio vrata. (Agent–subject, Patient–object)

   Marko.nom open.3sg.past door.acc

   'Marko opened the door.'

   b. Vrata su se otvorila. (Cause is eliminated; Patient is mapped onto the subject)

   door.nom SE open.3sg.past

   'The door opened.'

(taken from Ilić, 2020a: 79)

At first glance, it might seem difficult to tell apart lexical reflexive verbs and anti-causative verbs. However, one could use the purpose clause test in order to distinguish between the two types. Purpose clauses can be used to complement clauses with lexical reflexive verbs, as exemplified in (9a), but they cannot be used with anti-causative verbs (9b).

9. a. Ona se popela da bi mu pokazala da se ne plaši.

   she.nom SE climb.sg.fem to would.3sg him show.3sg.fem that SE not afraid.3sg.pres

   'She climbed in order to show him that she was not afraid.'

   b. *Vrata su se otvorila da uđe svež vazduh.

   door.nom SE open.pl.neut to SE come.3sg.pres fresh air.nom

   '*The door opened to let the fresh air in.'

S*e*-verbs form an adequate research area for testing the hypothesis about the innateness of semantic roles (Pinker, 1984, 1989) due to various syntactic conditions in which they appear. The innateness hypothesis will be discussed in the next section.

2.2. The acquisition of verbs

2.2.1. Nativism – fundamental ideas

According to Chomsky's (1975, 1981, 1986) generative theory of Universal Grammar (UG), all human beings are endowed with the knowledge of UG. Children acquire their native language with the help of the Language Acquisition Device (LAD), a genetically transmitted language faculty, which is essential in children's first language acquisition, directing them in the process of linguistic analysis.

The UG theory accounts for children acquiring a language "without explicit teaching, on the basis of positive evidence (i.e. what they hear), under varying circumstances, and in a limited amount of time, in identical ways across languages" (Guasti, 2002: 3). Parents do not usually use any formal instruction in the process of LA. Therefore, children acquire their native language spontaneously, based on the linguistic input provided in their environment. Corrections are rare, and even when they do occur, children continue goofing (Guasti, 2002; Pinker, 1989). Moreover, many children are not provided with systematic feedback (Brooks–Tomasello, 1999). Pinker reported some of the results from studies looking into parental feedback, which found that "the main difference between the frequency of a form of feedback following a well-formed utterance and following an ill-formed utterance was a few percentage points" (1989: 13). Research has also shown that negative evidence is not always available to children (Bowerman, 1988; Morgan–Travis, 1989; Marcus, 1993). Children acquire their mother tongue in a limited amount of time regardless of the varying amount of

input. Moreover, they all do so in the same manner in spite of the structural differences between languages (Guasti, 2002).

The fact that children acquire their native language in a limited amount of time, with a relatively small amount of input, after which they are able to form sentences they have never heard before, led to the formulation of the Poverty of the Stimulus Argument (Chomsky, 1980, as cited in Ilić, 2016: 117), which supports the existence of the mental linguistic capacity. The question of how people know so much when the information available to them is insufficient is also referred to as Plato's Problem (Chomsky, 1986). Chomsky (1986) aims to provide a solution to the problem by claiming that linguistic knowledge is innate. Pinker (1989) goes a step further, by trying to solve a more specific paradox that he names Baker's paradox – namely, how children acquire the syntactic properties of verbs. Since the main concern of the present study is the problem of the acquisition of different syntactic and semantic properties of *se*-verbs in Serbian, Pinker's main ideas will be discussed in more detail in the upcoming section.

Two approaches to the acquisition of argument structure can be distinguished within the generative framework. Although they follow the same basic principles, their representatives propose different inducting mechanisms for the acquisition, namely semantic and syntactic bootstrapping. Pinker (1984, 1989) was the first one to discuss semantic bootstrapping, but the term was actually coined by Gleitman (1990), whose theory of syntactic bootstrapping is based on the criticism of semantic bootstrapping. Let us first briefly discuss both.

2.2.1.1. Semantic and Syntactic Bootstrapping Hypotheses

The Semantic Bootstrapping Hypothesis proposes that a child possesses semantic notions in addition to abstract syntactic categories (Pinker, 1984, 1989). According to Pinker (1994: 385), "certain contingencies between perceptual categories and syntactic categories, mediated

by semantic categories, could help the child get syntax acquisition started". Discovering the right syntactic functions for the theta-roles of Agent, Theme, Goal etc. forms part of the development of grammar (Pinker, 1984, 1989). Pinker says that his theory is "about how the child begins learning syntax" (1994: 385). As he claims, universal linking rules are innate and help children draw conclusions. For example, one such a rule links Agents with subjects of active sentences. Having recognized a certain word as the Agent in a given situation, a child can infer that that word should take the position of the subject. Transitive verbs are expected to be acquired among the first in child language because they show a canonical linking of semantic roles and syntactic functions (Agent–subject and Theme–object) (Pinker, 1984, 1989). Many studies have supported the claim that knowledge of thematic roles is innate (Golinkoff, 1975; Golinkoff–Kerr, 1978; Slobin–Bever, 1982; Pinker–Lebeaux, & Frost, 1987; Gropen–Pinker–Hollander, & Goldberg, 1991). More recent studies have provided behavioural evidence for abstract agent and patient categories as well (Arunachalam–Waxman, 2010; Lidz–Gleitman, & Gleitman, 2003; Naigles, 1990; Noble–Roland, & Pine, 2011; Savage–Lieven–Theakston, & Tomasello, 2003).

Pinker (1989: 291–292) introduced the idea of children's acquiring verb classes via broad and narrow semantic constraints, illustrated in (10):

10. Linking rules

    Broad-range conflation classes and rules

    Narrow-range conflation classes and rules

    Semantic structures for individual verbs

    Conceptual structures for particular kinds of events and states

Broad constraints define the semantic roles of verb arguments in general, and they are directly related to universal linking rules for mapping conceptual structures to syntax. On the other hand, narrow constraints refer to very subtle nuances in meaning, which are more

difficult to master, and therefore lag behind in verb acquisition. Pinker (1989) explains that, when an overgeneralization occurs in child speech, it happens "because the child is not yet able to assign the verb to the narrow class to which it belongs" (as cited in Ilić, 2020a: 80; for more details see Brooks–Tomasello, 1999).

Pinker assumes that children start with "some mechanism that reliably identifies grammatical functions…before the learning of non-cognitively-given verb semantic structures begins" (1989: 295). He proposes two possible ways in which verb learning could take place. In the first, parents play a crucial role by using only those verbs that show universal linking rules. Later on, children restructure their parameters in order to adapt them to the non-canonical verbs they come across. The second approach, which does not impose such strict conditions regarding the input, and is therefore more child-focused, suggests that children rely on a variety of features, which allows them to structure phrases. For instance, subjects share a pool of properties across different languages: they appear high in phrases and precede objects; show agreement with verbs; are coreferential with subjects of embedded and conjoined clauses etc. It is feasible to assume that children rely on these factors altogether, thus correctly assigning the syntactic function of the subject to the Agent of a particular event. Finally, Pinker (1994) does not deny that children's first verb meanings are learnt relying on the context.

Contrary to Pinker, Gleitman (Gleitman, 1990; Landau–Gleitman, 1985) assumes that children cannot learn verb meanings from the context. She suggests that the direction of learning is from syntax to semantics, and not the opposite. Under this approach, a child is supposed to infer about the participants' semantic roles and their relations based on the syntactic frames of a verb. There are three types of evidence that Gleitman (1990) employs to support the Syntactic Bootstrapping Hypothesis: negative evidence, positive hypothetical evidence, and empirical evidence.

Negative evidence focuses on the idea that verb meanings cannot be learned only through observation. Gleitman (1990) argues that using different verbs to describe a single situation can be rather baffling for children. Pinker's (1994) counter-argument is that verb repetition in multiple contexts eases verb learning. Gleitman (1990) further suggests that learning mental verbs could represent a serious challenge, since their meaning is not retrievable from the context. On the other hand, Pinker believes that children can make deductions regarding the meaning of mental verbs in a similar way as adults, relying on their own thoughts and feelings. In addition, supplementary information about verb meanings can be provided by their mothers, who are sensitive to their feelings and tend to comment on them.

When it comes to positive hypothetical evidence, Gleitman (1990) believes that a child can make inferences about verb meanings based on syntax. For instance, they can draw conclusions regarding the number of verb arguments. Even so, syntax cannot be very helpful regarding root meanings, as pointed out by Pinker (1994). In other words, although syntactic frames provide information on the number of verb arguments, they cannot help children discern various verb meanings.

Lastly, numerous empirical studies support the Syntactic Bootstrapping Hypothesis (Hirsh-Pasek–Gleitman–Gleitman–Golinkoff, & Naigles, 1988; Naigles, 1990; Fisher–Hall–Rakowitz, & Gleitman, 1994). However, none of them involves the possibility of verb learning based only on syntax, since all of these studies made use of visual stimuli (videos and puppets) (Pinker, 1994). Thus, the learning process in these experiments involved observation. Furthermore, the study by Fisher et al. (1994) did not actually involve any verb learning as it tested finding the right verb equivalents in English. Hence, it tested the verbs the participants in the study had acquired before. Pinker (1994) suggests that an experiment could prove that children can acquire verb meaning from syntax only if they heard a verb

used in different syntactic frames without being exposed to any visual stimuli or content words at the same time.

At one point, Gleitman (1990) herself admits that some verbs are learned from the context: "the syntax is not going to give the learner information delicate and specific enough, for example, to distinguish between such semantically close items as *break, tear, shatter* and *crumble*. Luckily, these distinctions are almost surely of the kinds that can be culled from transactions with the world of objects and events" (1990: 35, as cited in Ilić, 2016). As Anđelković (2012) claims, the Syntactic Bootstrapping Hypothesis involves a certain extent of circularity of the acquisition mechanism, because a certain level of linguistic knowledge (being able to distinguish between nouns and verbs, or to understand the semantic content of noun phrases) is necessary to analyse the information obtainable from a syntactic frame. Nonetheless, it has been claimed that recognizing the number of noun phrases in an utterance is sufficient for placing a verb into a suitable syntactic category (Fisher et al., 1994). Being sensitive to the number of arguments, children are expected to acquire intransitive verbs (which are characterized by the least number of arguments) first, under this hypothesis (as cited in Anđelković, 2012).

The two hypotheses have spurred a wide range of cross-linguistic research on verb acquisition. Whereas some researchers have argued that children's linguistic knowledge needs time to mature and to become adult-like (Borer–Wexler, 1987; Miyamoto–Wexler–Aikawa, & Miyagawa, 1999; Lee–Wexler, 2001; Ito–Wexler, 2002; Babyonyshev et al., 2001), others have claimed that children possess early knowledge of argument structure (Snyder et al., 1995; Lorusso et al., 2005; Costa–Friedmann, 2012). While the former approach supports the Maturation Hypothesis, the latter one supports the Continuity Hypothesis. Let us now look at these two hypotheses in greater detail.

2.2.1.2. Maturational delay – the Maturation Hypothesis

Unaccusatives, anti-causatives, passive and raising constructions are characterized by A-movement (movement to an argument position). This type of movement occurs when an argument moves from a lower position inside the VP (verb phrase) to the position of the specifier of TP to become a subject. A-movement (e.g. in passives) is assumed to lag behind A-bar movement (movement to a non-argument position, e.g. in wh-questions), which is available to children from the beginning of acquisition. One of the most influential studies on the acquisition of movement, which speaks in favour of the child's linguistic maturation, was conducted by Borer–Wexler (1987). Borer–Wexler (1987) first termed their hypothesis the Maturation of A-chains Hypothesis, and the A-chain Deficit Hypothesis (ACDH) later (1992). The hypothesis was centred on children's difficulty with passive constructions. After Maratsos–Fox–Becker, & Chalkley (1985) showed that children are able to comprehend passive constructions with actional verbs, Borer–Wexler (1987) claimed that the children's success with actional passives should be contributed to them being interpreted as adjectival. For instance, upon hearing a sentence such as "The box is opened", a verbal and an adjectival reading are both available to children, so they could opt for the latter. Borer–Wexler (1987) also suggested that the children's inability to form A-chains results in their difficulty with non-actional passives.

In response to criticism regarding the children's ability to perform A-movement from the VP-internal position to the position of the specifier (spec) of TP, thus correctly placing subjects before finite verbs, Borer–Wexler (1992) revised the initial version of the hypothesis, claiming that only non-trivial A-chains present a problem for children. According to the revised version of the hypothesis, children are not expected to have difficulty with the movement from the spec VP to the spec TP. However, the hypothesis has implications for the children's use of unaccusative verbs. Since children are incapable of forming non-trivial A-

chains, it is expected that unaccusative verbs will either appear in VS order or they will be misanalysed as unergative verbs. Miyamoto et al.'s (1999) study on the omission of topic, nominative, and object markers by a Japanese-speaking child (2;3–3;0) showed that the nominative marker was most frequently dropped with unaccusative verbs. Since the omission did not occur with unergative and transitive verbs, Miyamoto et al. concluded that the child did not form the A-chain with unaccusatives. Lee–Wexler (2001) obtained comparable results for the omission of the nominative marker in Korean, which was more frequent with unaccusatives than with transitives or unergatives at the age of two. Ito–Wexler (2002) further looked into nominative case drop and found that it was significantly more frequent with unaccusatives than with transitives or unergatives at the second stage of LA (2;2–3;0). However, the same difference was not be found at the next stage of LA (3;1–3;7). The authors suggest that the results can be taken as evidence that children misanalyse unaccusatives as unergatives at the third stage of LA. Alternatively, this could imply that their knowledge of A-chains has matured.

A study dealing with Russian unaccusatives (Babyonyshev et al., 2001) offers further support for the maturation of A-chains. Russian genitive of negation construction is used with nominal phrases that appear with unaccusative and passive verbs. An example of such a negative construction with an unaccusative verb is provided in (11).

11. Olgi Borisovnoj net.

    Olga Borisnovna.gen. isn't

    'Olga Borisovna isn't here.' (Babyonyshev et al., 2001: 16)

After being generated as Themes, nominal phrases can either remain in situ, or move to the position of the subject (the specifier of TP). Babyonyshev et al. (2001) suggest that in the former case, covert movement takes place. The results of the experiment indicate that children under the age of four misanalyse unaccusative verbs as unergatives, since nominal

expressions in the genitive case were used with unaccusative verbs in less than 50% of cases. Otherwise, the children in the study used a nominative argument. On the basis of the obtained results, Babyonyshev et al. (2001) formulated the External Argument Requirement Hypothesis (EARH), which predicts that children have difficulty with the constructions which do not project an external argument.

Conversely, in Sano (2000), Sano–Endo, & Yamakoshi (2001), and Sano (2003), evidence is provided for the delayed acquisition of passive verbs in comparison with unaacusative verbs in Japanese. The children in these studies (from approximately 3 to 6 years old) had difficulty understanding passive constructions, which was not the case with unaccusative verbs. The authors argue that this presents a challenge to Borer–Wexler's (1987) ACDH, since both types of verbs involve A-chains. More cross-linguistic evidence opposing the ACDH comes from the other line of research into the acquisition of verbs and will be discussed next.

2.2.1.3. Early knowledge of verbs – the Continuity Hypothesis

The second line of research on verb acquisition within the generative framework proposes that children are sensitive to syntactic differences from the earliest age. Research based on a longitudinal and a cross-sectional corpus carried out by Lorusso et al. (2005) showed that children are capable of distinguishing between unergative verbs and unaccusative verbs at a very young age since they produce them in different syntactic environments. The longitudinal corpus included data collected from a sample of four children ranged in age from 18 to 36 months, whereas the cross-sectional corpus consisted of fifty-nine children's productions (ranged in age from 22 to 35 months). The results show that children produce overt subjects with unaccusative verbs more frequently than with any other verb type in Italian. Interestingly, they produce post-verbal subjects in greater proportion than pre-verbal subjects only with unaccusative verbs, which implies that children are able to differentiate between

verb types. As pointed out by Ilić (2016: 123): "the fact that the children in the experiment treated verbs with the same argument structure in the same way suggests that they had already made generalizations across different classes of verbs".

Costa–Friedmann (2012) came to the same conclusion. After consulting samples obtained from seven large corpora of early child language and seven structured repetition and storytelling experiments in European Portuguese and Hebrew,[7] Costa–Friedmann (2012) showed that children acquiring these two languages are not only sensitive to different word orders with unergatives and unaccusatives, but that they are also capable of performing A-movement when they produce unaccusatives in SV order. Costa–Friedmann (2012) used specific tasks with the purpose of eliciting unaccusative verbs and possessive datives in SV and VS orders, in order to discard the possibility of misanalysing unaccusatives as unergatives when children uttered SV unaccusative sentences. Taking into account that possessive datives are only allowed with unaccusative verbs in Hebrew, the use of SV unaccusative constructions with possessive datives would imply that A-movement has been performed. An example of an unaccusative used with a possessive dative is illustrated in (12):

12. Ha-ciyur nirtav le-miri.

    the-drawing got-wet to-Miri

    'Miri's drawing got wet.' (Costa & Friedmann, 2012: 21)

Since the results showed that the children didn't have difficulty producing this construction in SV order, it was concluded that children do not mistake unaccusatives for unergatives.

Snyder et al. (1995) also found evidence for early sensitivity to the unergative/unaccusative distinction. The results of their study suggest that children produce different auxiliaries with reflexive and non-reflexive clitic pronouns successfully in French and Italian. In these languages, reflexive forms (analysed as unaccusative constructions in which a Theme

[7] Children acquiring European Portuguese ranged in age from 2;7 to 3;7 (spontaneous speech) and from 2;1 to 3;0 (repetition experiment), whereas children acquiring Hebrew ranged in age from 1;6 to 6;1 (spontaneous speech) and from 1;6 to 4;0 (repetition and storytelling experiments).

argument surfaces as a subject) are used with the auxiliary *be*, while non-reflexive forms are used with the auxiliary *have*. One French-speaking child (in her transcripts ranging between the ages 2;1;9 and 3;3;12) and three Italian-speaking children (all younger than three) produced the right auxiliary almost flawlessly. Therefore, Snyder et al.'s (1995) findings speak against the ACDH.

Snyder–Hyams (2008) analysed the acquisition of passives and provided a different account of the children's difficulty with this verb type from the one offered by Borer–Wexler (1987). Namely, the authors assume that passives are challenging for children not due to their inability to form A-chains, but because they need to make a connection between an underlying direct object and a surface subject. The demoted subject presents an additional burden. Snyder–Hyams (2008) suggested that structural and inherent case features, which are still not distinctive for children at a very young age, lie at the core of this problem. The demoted subject is assigned dative or prepositional case (inherent features), whereas the promoted object is assigned nominative case (structural features). The authors believe that this difficulty gradually decreases with age.

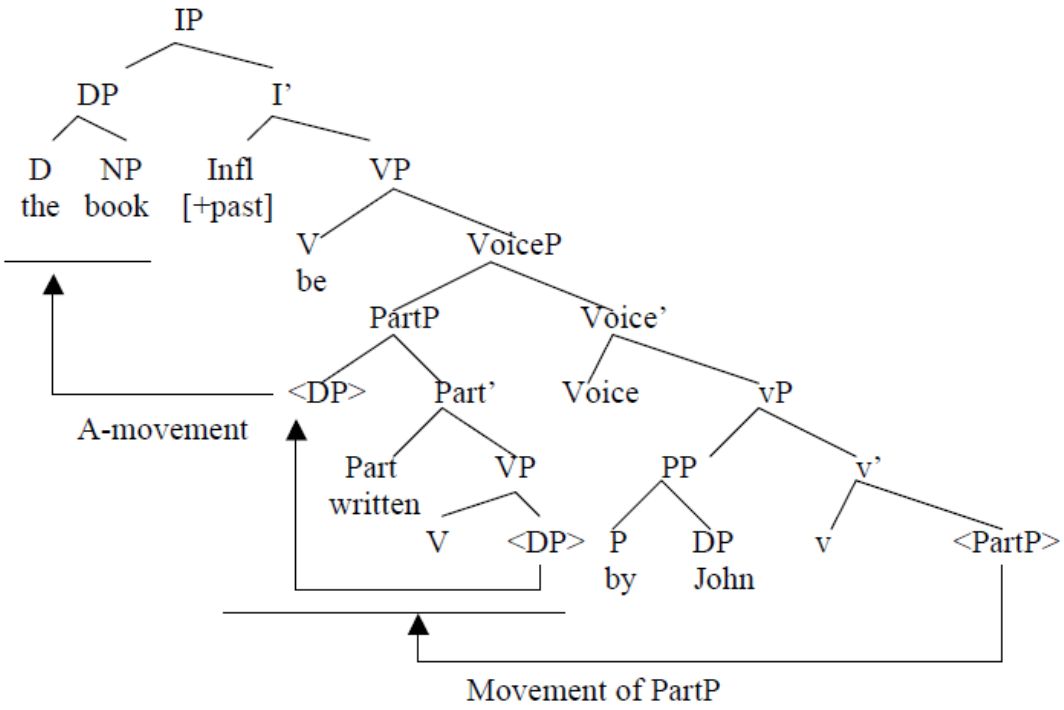
More recently, Snyder–Hyams (2015) defined the Universal Freezing Hypothesis (UFH), suggesting that smuggling in verbal passives is unavailable to children before the age of four because they are incapable of making an exception to the Freezing Principle, first defined by Wexler–Culicover (1980). The Freezing Principle states that: "if a node A of a Phrase-marker is frozen, no node dominated by A may be analysed as a transformation" (Wexler–Culicover, 1980: 119). Snyder–Hyams (2015: 347) define the UFH as stated in (13):

13. "For the immature child (until about age 4), the Freezing Principle always applies. No subpart of a moved phrase can ever be extracted."

Smuggling was first defined by Collins (2005), following Baker's Uniformity of Theta-Assignment Hypothesis (UTAH, Baker, 1988, 1997), as a process by which an underlying

object needs to pass a logical subject to become the subject of the clause. Simple argument movement of Theme to the position of the specifier of IP (inflectional phrase) would violate the principle of relativized minimality (RM), as defined by Rizzi (2001, 2004), because of the intervening logical subject. Collins suggests that the Theme argument moves past the DP that is situated in the specifier of vP (logical subject) by means of smuggling – moving within a larger PartP (Participle Phrase), after which it raises to its surface position. This process is illustrated in (14). According to Collins (2005), this is only possible because there are some contexts in which the Freezing Principle fails to apply – such as in passive constructions. Snyder–Hyams (2015) claim that it is exactly this strategy that is not available to children. They cannot smuggle, and the intervening argument blocks the movement of the object.

14. The book was written by John. (Collins, 2005: 90, 95)



Snyder–Hyams (2015) state that three-year-olds only succeed with A-movement in case the intervening argument is eliminated, as is the case with some reflexive-clitic constructions in French and Italian. In their paper, Snyder–Hyams (2015) use a term to refer to a specific type of reflexive-clitic constructions in Romance languages that have a middle or anti-causative

meaning, namely 'formally, but not semantically, reflexive clitic constructions (FRCCs)' (2015: 3). Following Sportiche (2014), they argue that these constructions resemble verbal passives, yet they contain no intervening argument. They also point out that these constructions never take a by-phrase, nor are they followed by a purpose clause. Snyder–Hyams (2015) provide examples from the spontaneous speech of Italian and French children as young as two, showing adult-like performance on FRCCs. They interpret the results as giving support to the claim that children have no problem with A-chains, but with an intervening argument that is present with verbal passives.

The present study will take into consideration all the findings within the generative approach. If it is shown that children acquire reflexive verbs in Serbian at an early stage of acquisition, the results will speak in favour of the Continuity Hypothesis. The clitic *se*, which is a sign of detransitivisation, makes these verbs different from transitive and unergative verbs in Serbian. Moreover, it will be interesting to compare the results of the production of Serbian anti-causative verbs with the results obtained by Snyder–Hyams (2015) for the production of FRCCs.

2.2.2. A usage-based theory – fundamental ideas

Arguing in favour of the "nurture" side of the nature-nurture debate, psycholinguistic studies have rejected the nativist Continuity Hypothesis and centred on the Discontinuity Hypothesis within a Cognitive Linguistics framework recently. The supporters of this hypothesis (Tomasello, 2003; Lieven, 2008) believe that language rules are not innate, but are learnt inductively instead. Tomasello (2003), who is one of the main representatives of this theory, believes that non-linguistic capacities guide children in the process of language acquisition. He goes on to explain that it is through general cognitive and interpersonal capacities that language learning takes place. He specifies four processes that are crucial for LA, namely

intention-reading, relevance assumptions, role reversal imitation, and pattern-finding. As Tomasello explains, children "come to a new understanding of their own intentional actions… then use their 'like me' stance to understand the behaviour of other persons in this same way" (Tomasello, 1999: 72). Therefore, intention-reading represents the process of acquiring conventional forms through the interaction with the caregiver. Recognizing certain content as relevant (relevance assumptions) and imitating communicative acts (role reversal imitation) are both fundamental to Tomasello's account of LA as well. Finally, the cognitive abilities of pattern-finding and analogising make it possible for children to acquire L1. According to Tomasello (2003), both lexical items and grammatical rules are acquired in this way.

Many studies have shown that children's language at the beginning of their grammatical development does not centre around abstract grammatical categories, but concrete items provided in their linguistic input (Childers–Tomasello, 2001; Lieven et al., 1997; Lieven, 2008). Abstract and adult-like constructions are produced only later on the basis of imitation of the constructions they hear in their environment and their cognitive categorization.

Using a distributional analysis of the speech of twelve children at a young age (approximately from their first until their third year), Lieven et al. (1997) showed that many of the children's first utterances can be analysed as "frozen". In other words, children tend to use utterances revolving around specific examplars, which they have often heard before. Yet, the authors pointed out that it is challenging to maintain the same analysis when the child reaches 400 multiword utterances.

Lieven (2008) suggests that item-based learning largely depends on word frequency. Nevertheless, at one point the author adds that "it is clear that children are sensitive to the basic typological characteristics of their language from an early age" (2008: 454).

The results of a study coming from a Cognitive Linguistics framework conducted by Brooks–Tomasello (1999), support Pinker's hypothesis that children base their use of verbs on their belonging to narrow-range semantic classes (Pinker, 1989). The production experiment included ninety-six children in three age groups at 2;6, 4;6 and 6/7 years of age. In addition to testing Pinker's hypothesis, Brooks–Tomasello (1999) also tested the hypothesis that children rely on indirect negative evidence. This phenomenon is known as preemption, frequently discussed in the literature (Braine–Brooks, 1995; Goldberg, 1995; Bates–MacWhinney, 1989). It implies that hearing certain forms in the cases in which they would expect to hear a different pattern based on a given situation, prevents children from using the constructions they haven't heard. Interestingly, just as Pinker's hypothesis, the preemption hypothesis was confirmed as well. The prediction regarding Pinker's hypothesis (1989) was that children would respect the assigned transitivity of a verb more if the verb belonged to a fixed transitivity class (either transitive or intransitive), than if it belonged to an alternating transitivity class. The results confirmed this, but it was shown that it takes some time for children (from 2.5 years to 4.5 years) to recognize which verbs take which argument structures.

Before we move to the research methodology of the pilot study, existing research on the acquisition of *se*-verbs across languages and verbs in Serbian will be briefly discussed.

2.3. The acquisition of *se*-verbs in different languages

As discussed at length in Section 2.2.1.3., cross-linguistic research has shown that children start producing reflexive verbs at a young age. Snyder et al.'s (1995) findings, analysing the speech of one French-speaking child (in her transcripts ranging between the ages 2;1;9 and 3;3;12) and three Italian-speaking children (all younger than three), show that reflexive verbs

do not pose a difficulty for children since the participants in the study used the right auxiliary with reflexive verbs almost flawlessly.

As opposed to reflexive verbs, there have been some findings that suggest that the production of reciprocal verbs is delayed. Berman (1985) stated that reciprocal verbs are acquired after reflexive verbs, since they are conceptually more difficult, although with the exclusion of verbs such as 'kiss' or 'hug', which she considers "most typically reciprocal" (1985: 333). Therefore, it can be expected that some reciprocal verbs are acquired before others. Berman (1985) also stated that inchoactive verbs[8] are acquired last. She explained that the difficulty with inchoactive verbs may be due to "the conceptual difficulty of distinguishing between being in a state and entering into a state" (1985: 333). She named three stages in the acquisition of verbs in Hebrew. The first stage involves alternating verb patterns of a few verbs that children are familiar with and the event types they denote. At the next stage, children start extracting semantic concepts. The last stage of verb acquisition involves acquiring "a metalinguistic knowledge of the system of verb-pattern alternation as a highly abstract formal apparatus, coupled with conventionalised lexical knowledge of the many instances where this system does not manifest a one-to-one relation between form and function in the current lexicon of Hebrew" (Berman, 1985: 333) (cf. Pinker (1989) on broad and narrow semantic constraints).

In a CHILDES study comparing early verb production of four children in Turkish between the ages 1;1,19 and 3;3,3 (Ketrez, 1999), there was only one attempt of forming a reciprocal verb, which failed, because the child replaced it with a passive verb. However, one example of a verb used with the complement *each other* was noted. The same study found a very early use of passive and middle verbs. Nevertheless, as the author notes, this does not imply the

[8] Inchoactive verbs describe a change of state (e.g. *melt*).

complete acquisition of the structure, since the children had difficulty in producing some specific constructions until the age of 2;8.

On the other hand, the acquisition of some other types of *se*-verbs remains less clear. The results of the studies that support the Maturation hypothesis (Borer–Wexler, 1987) discussed in detail in Section 2.2.1.2., suggest that the acquisition of unaccusative and anti-causative verbs is delayed, due to the children's inability to form A-chains, i.e. to move an argument from a VP-internal position to the position of the specifier of TP. Furthermore, various studies looking into the children's production and comprehension of anti-causative verbs have indicated that children tend to come up with implicit Agents, which do not form part of the structure of anti-causative verbs (Roeper, 1987; Bowerman, 1991; Verrips, 2000; Ilić, 2015). After conducting comprehension experiments, Roeper (1987) concluded that three-year-olds do not differentiate between passives and anti-causatives, which means that they overgeneralize the implicit external argument to anti-causatives. Bowerman (1991) came to a similar conclusion upon analysing a corpus of early spontaneous speech of her two daughters. She found examples of an oblique Agent occurring with anti-causatives ('How come these two broke? By who?'). More recently, Verrips (2000) found further evidence for the claim that children represent anti-causatives as passives, which does not follow from adult syntax. He conducted different comprehension experiments with Dutch children between 4;2 and 6;9 years old. Interestingly, no age effect was found. Older participants in the study were as likely as younger participants to respond to anti-causative questions with implicit Agents. Finally, in her study on the production of verbs with different argument structure at different stages of LA, Ilić (2015) found that the production of anti-causative verbs lags behind other verb types. Moreover, she noted that children tend to come up with implicit Agents while producing anti-causatives.

Finally, a study that examined the acquisition of *se*-verbs in Croatian as L2 (Pavlinušić–Kelić, 2001) has shown that linguistic structures which mark prototypical semantic concepts are acquired first. The production of true reflexive, quasi reflexive and reciprocal verbs was tested before, right after and some time after the subjects received language instruction on *se*-verbs. The production of true reflexive verbs was most successful in all three testing situations.

Taking into consideration these studies, as well as the difficulty that children have with alternating transitivity discussed in Section 2.2.2, it can be expected that anti-causative verbs are fully acquired after reflexive verbs, due to their greater semantic complexity. However, this is in contrast with Snyder–Hyams's (2015) findings regarding FRCCs (for more details see Section 2.2.1.3.). An overview of studies that looked into the acquisition of verbs in Serbian will be provided next.

2.4. Verb acquisition in Serbian

2.4.1. Early verbs in Serbian – a usage-based account

Among the studies looking into the acquisition of verbs in Serbian, Anđelković (2012) analysed verb production of children at the early stages of language acquisition (18–26 months), as well as child-directed speech. The study was based on the early spontaneous speech of eight children (four boys and four girls) available in the Serbian Electronic Corpus of Children's Early Language (Anđelković–Ševa, & Moskovljević, 2001), standardized according to the CHILDES database system (MacWhinney, 1989). Anđelković (2012) presented a list of verbs produced at the age of eighteen months and analysed the development of argument structure. Her analysis of argument structure was centred on three high-frequency verbs: *dati* 'give', *imati* 'existential have' and *imati* 'transitive have'.

Some non-transparent verbs, relational verbs, state verbs, and polysemous verbs appeared in Anđelković (2012)'s inventory of verbs produced at a very young age (18 months). Therefore, the author suggests that the assumption that the acquisition of polysemous verbs and perceptively unavailable verbs (e.g. state or psychological verbs such as *wait* or *love*) is delayed, as some other studies aimed to prove (Huttenlocher–Smiley, & Charney, 1983), should be reconsidered.

In addition, Anđelković's (2012) findings challenged Pinker's (1984, 1989) Canonical Linking Hypothesis, as well as the nativist assumption that one-place predicates are acquired first (Fisher et al., 1994), since some verbs with a non-canonical mapping (*imati* "existential have") and verbs with three arguments (*dati* 'give') were produced at the earliest age. The frequencies of existential and transitive *imati* "have" were quite equally balanced in the children's speech. However, Anđelković's (2012) claim that the existential *imati* "have" is perceptively unavailable is somewhat questionable, since it is often used to refer to something that the child sees in the extra-linguistic reality, as was later shown in Ilić (2015).

Apart from the study which looked into different verb types produced at an early stage, there was also a study conducted on verbal aspect. Savić (2011) looked into the acquisition of verbal aspect in Serbian. The aim of the research was to discover whether there are any age differences (3–5 year-old children and adults) in the usage of aspect in narratives and in the comprehension of two aspectual forms: perfective and imperfective. The data revealed that the acquisition of the semantics of perfective and imperfective does not happen simultaneously: the acquisition of perfective precedes the acquisition of imperfective, because the semantics of imperfective is more complex and its acquisition requires a certain level of cognitive and pragmatic development.

In the conclusion of her thesis, Savić (2011) argued that mastering the semantics of aspect (especially imperfective) and its functions is a long-term process that lasts through the whole

preschool period. Even though children use aspectual forms as early as they start making their first utterances, the results of the research show that they are not aware of the meaning or functions which these forms have in narratives. As Savić (2011) claims, the basic mechanisms of associative learning (low level mechanisms) are responsible for the development of these forms at the beginning of acquisition, whereas higher mental functions are employed later.

2.4.2. Early verbs in Serbian – a nativist account

Recently, Ilić (2015) looked into the production of verbs of Serbian-speaking children at the early stages of language acquisition (18–52 months). The aim of the research was to examine the order in which verbs with different argument structures are acquired (unergative, unaccusative, anti-causative, transitive, and ditransitive verbs). Twenty verbs were tested (four verbs from each group) with a total of eighteen subjects belonging to six age groups (18–21, 23–25, 31–33, 35–38, 39–43 and 48–52 months, 3 participants per age group). The data collection technique was a structured interview and visual stimuli (toys and drawings) were used in a verb elicitation task. Though the sample was rather small, significant among-group differences were noted. The youngest group produced nouns instead of verbs in many cases. Participants of this age group produced mainly transitive and unergative verbs (both show subject–Agent correspondence), and a few unaccusative verbs, but no ditransitive or anti-causative verbs. This tendency continued in the next group, but the participants performed considerably better. Ditransitive verbs occurred for the first time. Anti-causatives were first produced in the 31–33-month-old group. This group produced virtually all unergative, unaccusative and transitive verbs, but still had difficulty with anti-causative and ditransitive verbs. The production in the next three groups did not differ significantly. Participants were successful in production across verb groups. The results indicate that

children at a lower stage of LA have more difficulty producing verbs with a complex argument structure (those with a third argument or those which involve a complex syntactic process of derivation from a transitive verb). Importantly, the participants used adequate tense morphology on the verbs from the earliest age, which indicates that they can recognize verbs as members of a coherent syntactic category, different from that of nouns, a finding which supports the nativist approach.

The results of this cross-sectional research seem to indicate that children acquire syntactically less complex verbs first. What needs to be stressed, though, is that the number of participants and verbs in this study was rather limited. Therefore, the results obtained should be taken with caution until a study with a larger number of participants is conducted. Another drawback of the research is the fact that the frequencies of the target verbs were not checked for.

Taking into account both the nativist and the usage-based theory, as well as the studies undertaken within these two frameworks, the author expects that the present research on the production of *se*-verbs in a cross-sectional and longitudinal study will tell us more about the nature of these verbs, and the acquisition of their argument structure in Serbian.

3. PILOT STUDY

The purpose of the pilot study was to gain first insights into the production of *se*-verbs at different stages of language acquisition, choose the stimuli, and further specify the chosen methodology. Once the stimuli for the verb elicitation task were prepared, a pilot test was conducted in order to make sure that the items were clear enough for the participants and that the length of the experiment was adequate.

3.1. Participants

A total of twenty-seven (N=27) monolingual Serbian-speaking children were tested. The participants belonging to three age groups of approximately three, four, and five years were tested. There were nine participants in each group. The age range in the first group was 35–41 months (N=9, M=36.78, SD=1.99). They will hereupon be referred to as three-year-olds. The age of three was chosen as the starting point because that is usually the earliest age for testing children (Eisenbeiss, 2010). Moreover, in the research conducted by Ilić (2015), it was shown that anti-causative verbs were first produced around this age. The age range in the second group, which will be regarded as four-year-olds, was 45–59 months (N=9, M=51.11, SD=5.67). Participants of a more evenly distributed age range could not be found, which is why the standard deviation was higher in this group than in the other two. The age range in the oldest group, the group of five-year-olds, was 60–67 months (N=9, M=63.78, SD=2.33).

None of the participants had any language impairment, learning disability, or visual or hearing loss. Kindergarten teachers provided all the children's relevant information (the child's birth date, information about their mother tongue and health status). The study was approved by the Ethics Committee at the Faculty of Philosophy, University of Novi Sad. The children were tested at the end of October / beginning of November 2018, in 'Tufnica' kindergarten, Novi Sad. The procedure is described in detail in the procedure section.

3.2. Design

The first independent variable was verb type with two or three levels, depending on the analysed data set (see Section 3.5. for more details). GLMER analyses were conducted for each of the three age categories separately in order to establish the differences in the production at different stages of first LA (fifteen analyses in total). In the second part of the research, the independent variable was age with three levels (three-year-olds, four-year-olds, and five-year-olds), while the verb type was kept stable (five analyses in total). Participants and stimuli were used as random effects. The effects of verb length and frequency were also examined as covariables. The lemma frequencies of target verbs were taken from the *Serbian Web Corpus* (s*rWaC*) (Ljubešić–Klubička, 2016), as their frequencies in child language could not be explored. Verb length was quantified by counting the number of letters.

The dependent variable in the pilot study was verb production coded as 'target' or 'non-target'. 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. Closely synonymous verbs, which belong to the same verb type, and therefore have the same number of arguments, were also accepted as target answers. Alternative verbs which do not belong to the same verb type were not accepted as target. Self-corrections were allowed, as they are known to be a common strategy in L1 acquisition (Ingram, 1989).

As Ambridge–Rowland (2013) claim, it is not enough to categorise children's answers by using a binary distinction. The type of error needs to be specified as well. Therefore, non-target answers were coded and qualitatively analysed 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. Transitive verbs instead of variants with the clitic *se* (e.g. *umiva lice* 'he is washing his face' instead of *umiva se*)

3. Target verbs without the clitic *se* (e.g. *kupa* instead of *kupa se* ‘bathe’)
4. Made-up verbs (including existing verbs used with a different valency)
5. Nouns
6. Other (adjective *otvorena* ‘open’ instead of the verb *otvoriti se* ‘open’)
7. No answer.

3.3. Stimuli

The five verb types that were tested in the experiment were true reflexive verbs, lexical reflexive verbs, true reciprocal verbs, lexical reciprocal verbs, and anti-causative verbs (in accordance with their categorisation given in Section 2.1.4). Six verbs were chosen per verb type, which makes a total of 30 target verbs presented to each participant. The distinction between true reflexive and lexical reflexive verbs was determined by respecting the criterion of the interchangeability of the clitic *se* and the reflexive pronoun *sebe* ‘self’. The distinction between true reciprocal and lexical reciprocal verbs was determined by respecting the criterion of the interchangeability of the clitic *se* and the reciprocal *jedan drugog* ‘each other’. Anti-causatives were chosen with respect to the detransitivisation process and the absence of +Cause theta-role. We tried to include verbs which denote familiar daily activities, some of them found in Anđelković’s (2012) inventory of verbs produced at the age of 18 months (e.g. *kupati* ‘bathe’, *ljuljati* ‘swing’, *udariti* ‘hit’, *otvoriti* ‘open’ all in their transitive forms), and which could be easily represented in the stimuli at the same time. The tested verbs were as follows:

1. true reflexive verbs: *oblačiti se* ‘dress’, *umivati se* ‘wash one’s face’, *brijati se* ‘shave’, *kupati se* ‘bathe’, *češljati se* ‘comb oneself’, *šminkati se* ‘put on make-up’;
2. lexical reflexive verbs: *igrati se* ‘play’, *penjati se* ‘climb’, *vrteti se* ‘spin’, *smejati se* ‘laugh’, *uplašiti se* ‘get scared’, *ljuljati se* ‘swing’;

3. true reciprocal verbs: *grliti se* ‘hug each other’, *ljubiti se* ‘kiss each other’, *tući se* ‘fight with each other’, *juriti se* ‘chase each other’, *gađati se* ‘throw something at each other’, *gledati se* ‘look at each other’;
4. lexical reciprocal verbs: *svađati se* ‘argue’, *trkati se* ‘race’, *mačevati se/boriti se* ‘fence/fight[9]’, *rukovati se* ‘shake hands’, *dobacivati se* ‘throw a ball at each other’, *sudariti se* ‘collide’;
5. anti-causative verbs: *otvoriti se* ‘open’, *zatvoriti se* ‘close’, *upaliti se* ‘turn on’, *ugasiti se* ‘go out’, *pokvariti se* ‘stop working’, *spojiti se* ‘merge’.

In addition to the five verb types tested, a few filler stimuli were also used. Their number was not great, due to limitations regarding children’s attention span and their willingness to continue with the experiment. However, as Ambridge–Rowland (2013) claim, not using fillers in elicited production tasks does not represent a problem, since it can only increase the children’s attempts at the production of the target construction. One challenge could be self-priming, which could be addressed adequately by using a counter-balanced or randomised trial order (Ambridge–Rowland, 2013), as was the case in this study.

Visual stimuli (drawings) were created in order to elicit target verbs. The characters presented in the stimuli were four family members and their friends, doing daily activities, which provided the necessary context for children. In the case of anti-causatives, some events that commonly occur within a household were depicted (e.g. the door closing). By opting for daily activities and events from everyday life, we intended to ensure the communicative sense of the task. As Ambridge–Rowland (2013) suggest, this is a crucial part in designing an elicited production task. Our intention was to present the activities in a straightforward manner, without the inclusion of any unnecessary details. Whether and to what extent the stimuli depicted the elicited verbs successfully will be discussed in Section 3.7.3.

[9] The verb *fight* is the closest translation equivalent of the verb *boriti se* in Serbian.

3.4. 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. The parental consent form is given in Appendix 1.

The data collection technique was a verb elicitation task. Twenty-seven participants were tested in single sessions that lasted around 10 minutes. Each child was tested individually, in the kindergarten hall (there were no other rooms available). The only people present were the interviewer, the interviewee and, occasionally, the kindergarten teacher, which was inevitable since some children were reluctant to participate without their teacher accompanying them. Occasional interruptions were unavoidable. External noise was also present in some cases, because other children in the kindergarten would move from one room to another or go outside. Other difficulties included children who avoided answering the questions 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 most of the time 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 importance of them helping the interviewer and giving their best to provide answers was pointed out, so that the children would gain additional motivation to complete the task.

The children were asked to name the activities presented in the pictures. Each stimulus contained two pictures. The examiner would tell the child what was presented in the first picture and elicit the answer for the second picture (Figure 1). The child was expected to look at the picture and the interviewer would ask him/her what the person/people in the picture was/were doing in the case of animate arguments of the verb (testing the production of true reflexive, lexical reflexive, true reciprocal, and lexical reciprocal verbs), or what happened in

the case of inanimate ones (testing the production of anti-causative verbs). An example of one experimental trial is the following:

"Interviewer: They are sitting here, and what are they doing here?

(the interviewer points to the picture)

Interviewee: They are kissing.

Interviewer: Good."

A sample of a whole interview is given in Appendix 2. The interviewer would give some positively neutral feedback and make a short break between two stimuli. 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 stimulus.

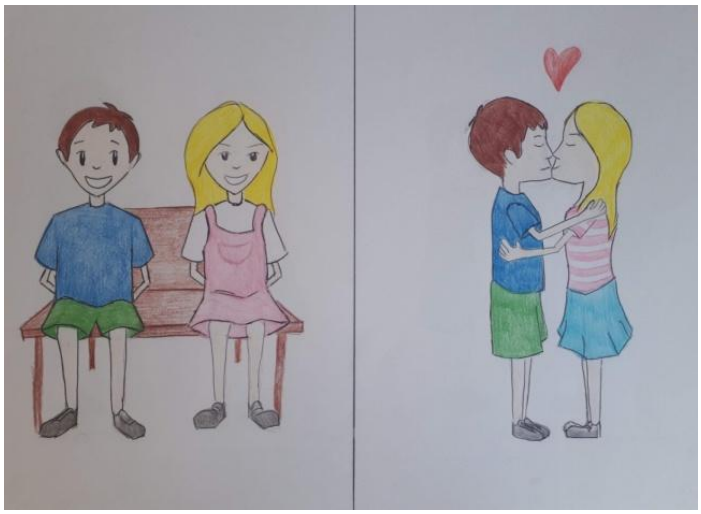


Figure 1 - Stimulus for *ljubiti se* 'kiss each other'

3.5. Data Analysis

A descriptive statistical analysis was conducted first, after which the data were analysed with the Mixed Effects Logistic Regression (GLMER), in the R free statistical software (R Core Team, 2017), by using *lme4* (Bates et al., 2019) and *lmerTest* (Kuznetsova–Brockhoff–Bojesen, & Jensen, 2019) packages.

In order to answer the research questions outlined in Section 1.2, five analyses of specific contrasts were conducted for each age group separately (fifteen analysis in total). Relying on

the percentage of the children's correct answers per verb type, we decided to contrast the two most successfully produced verb types with the remaining verb types. In order to answer the first research question (which *se*-verbs are produced better at different stages of first LA in Serbian), we conducted two analyses of the production of verb types on three levels: one comparing the production of true reflexive, lexical reflexive, and true reciprocal verbs, and the other comparing the production of true reflexive, lexical reflexive, and anti-causative verbs. We chose true rather than lexical reciprocal verbs since we were more interested in comparing the production of morpho-syntactically derived forms.

In order to answer the second research question (whether lexicality plays an important factor in the production of reflexive and reciprocal verbs), we checked for the difference in the production of true and lexical reflexive, and true and lexical reciprocal verbs. Therefore, two analyses of the production of the two investigated verb types were conducted: one comparing the production of true and lexical reflexive verbs, and the other comparing the production of true and lexical reciprocal verbs. Finally, there was another analysis of the production of verb types on two levels conducted, contrasting the production of true reciprocal verbs and anti-causative verbs, with the purpose of determining whether there is any difference in the production of the two verb types which are both semantically more complex than reflexive verbs.

In addition to the five analyses conducted for each age group separately, five analyses which show the differences in the production of the same verb type between the three age groups were also conducted, which gave us an insight into the increase in the production of specific verb types.

Finally, a qualitative analysis of non-target answers was conducted.

3.6. Results

3.6.1. Verb production per age group

Every child was expected to produce 6 target verbs of each verb type, which means that the maximum number of target answers per verb type was 54 in every age group. As shown in Figure 2, the production of both true reflexive verbs (N=36, M=4, SD=1.73) and lexical reflexive verbs (N=42, M=4.67, SD=1) was quite successful in the group of three-year-olds. On the other hand, the production of true reciprocal, lexical reciprocal, and anti-causative verbs was much lower. Unlike the production of true reflexive verbs, which was just below 70%, or the production of lexical reflexive verbs, which almost reached 80%, the production of true reciprocal verbs (N=20, M=2.22, SD=1.39) did not even reach 40% in the youngest group tested. The production of lexical reciprocal verbs (N=11, M=2.11, SD=1.30) and anti-causative verbs (N=10, M=1.11, SD=1.05) was twice as low, and it was around 20%.

Figure 2 shows that, except for the production of lexical reflexive verbs, which remained the same (N=42, M=4.67, SD=1), the production of all verb types increased in the group of four-year-olds. The production of true reflexive verbs was almost 80% (N=42, M=4.67, SD=1.12). However, the production of other verb types was still not as successful. The greatest increase in the production was noted in the case of true reciprocal verbs (N=32, M=3.56, SD=1.74), whose production almost reached 60% in the group of four-year-olds. The number of successfully produced lexical reciprocal verbs (N=18, M=2, SD=1.32) and anti-causative verbs (N=19, M=2.11, SD=0.93) was around 35%.

Five-year-olds performed better with all verb types. The production of true reflexive verbs (N=50, M=5.56, SD=0.53) was over 90%, whereas the production of lexical reflexive verbs was just below 90% (N=48, M=5.33, SD=0.87). The production of other verb types improved as well. True reciprocal verbs (N=40, M=4.44, SD=1.24) and anti-causative verbs (N=39, M=4.33, SD=1.22) were produced successfully in over 70% of the cases. The production of

lexical reciprocal verbs was still relatively low (N=30, M=3.33, SD=1.58), and it was the only verb type whose production was below 60% in the oldest tested group.

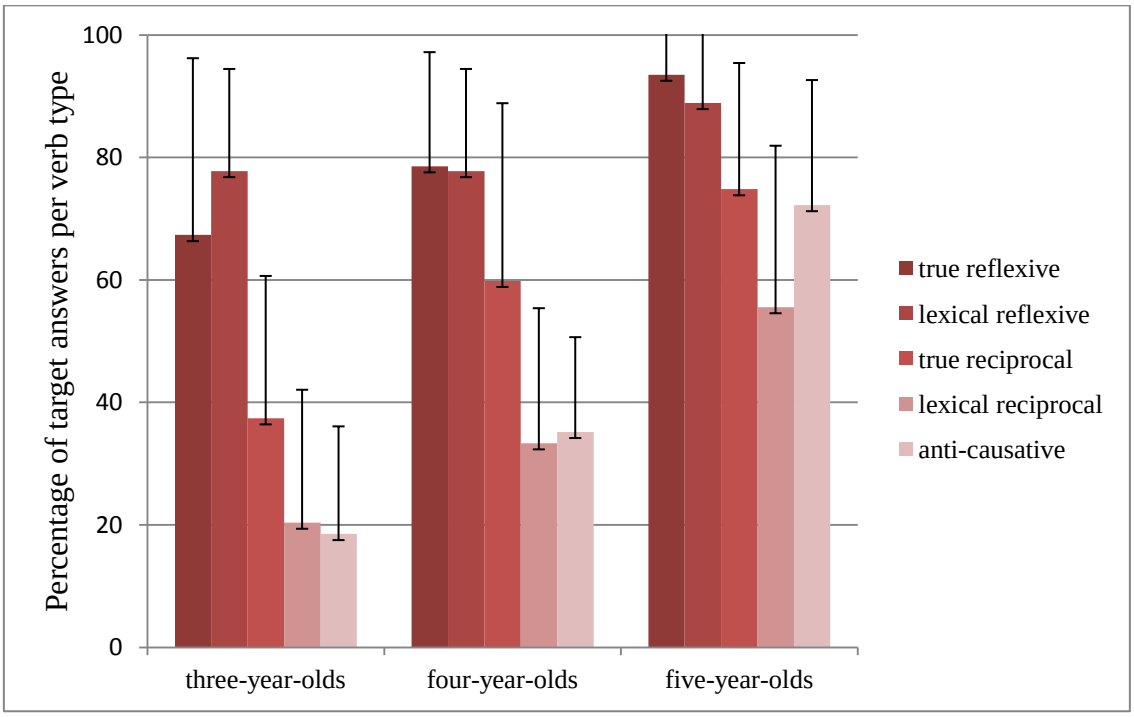


Figure 2 – Verb production per group in the pilot study

3.6.2. Three-year-olds

In the youngest tested group, the production of *se*-verbs differed with respect to some verb types. The GLMER analyses of the production of verb types on three levels gave significant results. The analysis of the production of true reflexive, lexical reflexive, and true reciprocal verbs (Table 1) showed that both true reflexive (β=1.823; z=2.003; Pr(>|z|)=.045*) and lexical reflexive verbs (β=2.890; z=2.305; Pr(>|z|)=.021*) were produced with greater success than true reciprocal verbs. No effects of verb length and frequency were found.

Random effects			*Variance*	*SD*
Subject : Intercept			1.183	1.088
Stimuli : Intercept			1.498	1.224
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	-1.234	.878	-1.405	.160
Trial Order	.021	.026	.799	.424
Verb Length	-.536	.377	-1.421	.155
Verb Frequency	-.202	.537	-.377	.705
Verb Type (lexical reflexive)	2.890	1.253	2.305	.021*
Verb Type (true reflexive)	1.823	.910	2.003	.045*

Table 1 – Differences in the production of true reflexive, lexical reflexive, and true reciprocal verbs at the age of 3

Similarly, the analysis of the production of true reflexive, lexical reflexive, and anti-causative verbs (Table 2) showed that both true reflexive (β=3.032; z=2.514; Pr(>|z|)=.011*) and lexical reflexive verbs (β=3.550; z=2.609; Pr(>|z|)=.009**) were produced more successfully than anti-causative verbs at this tested age. The effects of verb length and frequency were not significant.

Random effects			*Variance*	*SD*
Subject : Intercept			.421	.649
Stimuli : Intercept			.505	.710
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	-2.509	1.007	-2.491	.012*
Trial Order	.032	.024	1.297	.194
Verb Frequency	.082	.369	.222	.824
Verb Length	.201	.535	.376	.707
Verb Type (lexical reflexive)	3.550	1.360	2.609	.009**
Verb Type (true reflexive)	3.032	1.205	2.514	.011*

Table 2 – Differences in the production of true reflexive, lexical reflexive, and anti-causative verbs at the age of 3

The statistical analyses showed that there was no difference between the production of true and lexical reflexive verbs (β=-.553; z=-.528; Pr(>|z|)=.598), true and lexical reciprocal verbs (β=.196; z=.126; Pr(>|z|)=.900), or true reciprocal and anti-causative verbs (β=1.268; z=.868; Pr(>|z|)=.385). However, these results need to be taken with caution because of the very limited number of participants. For more details see Appendix 3a.

3.6.3. Four-year-olds

In the second tested group, the analysis of the production of true reflexive, lexical reflexive, and true reciprocal verbs did not give significant results (Table 3). The reason for this may be that the number of observations was too small to reach significant results at this tested age. The effect of verb length (β=-.788; z=-2.126; Pr(>|z|)=.033*) was significant.

Random effects			*Variance*	*SD*
Subject : Intercept			1.491	1.221
Stimuli : Intercept			1.232	1.110
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	1.556	.852	1.826	.067
Trial Order	-.072	.029	-2.467	.013*
Verb Frequency	-.160	.516	-.311	.756
Verb Length	-.788	.370	-2.126	.033*
Verb Type (lexical reflexive)	1.545	1.164	1.327	.184
Verb Type (true reflexive)	1.470	.897	1.639	.101

Table 3 – Differences in the production of true reflexive, lexical reflexive, and true reciprocal verbs at the age of 4

On the other hand, the production of lexical reflexive (β=3.222; z=1.824; Pr(>|z|)=.068.) and true reflexive verbs (β=2.879; z=1.887; Pr(>|z|)=.059.) was still better than the production of anti-causative verbs at this age, even though there was only a marginal difference,[10] which is shown in Table 4.

Random effects			*Variance*	*SD*
Subject : Intercept			.321	.566
Stimuli : Intercept			1.142	1.068
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	.655	1.162	-.564	.572
Trial Order	-.035	.025	-1.385	.166
Verb Frequency	-.161	.484	-.334	.738
Verb Length	.320	.695	.461	.645
Verb Type (lexical reflexive)	3.222	1.766	1.824	.068.
Verb Type (true reflexive)	2.879	1.525	1.887	.059.

Table 4 – Differences in the production of true reflexive, lexical reflexive, and anti-causative verbs at the age of 4

The statistical analyses again showed that there was no difference between the production of true and lexical reflexive verbs (β=.460; z=.357; Pr(>|z|)=.721), true and lexical reciprocal

[10] Marginal statistical differences were indicated by the GLMER model (. at the end of a number). Everything within the range of .05 and 1 will be interpreted as marginally significant, if a marginal difference was suggested by the model.

verbs (β=-1.830; z=-1.170; Pr(>|z|)=.242), or true reciprocal and anti-causative verbs (β=.552; z=.377; Pr(>|z|)=.706). For more details see Appendix 3b.

3.6.4. Five-year-olds

Interestingly, the results from the oldest group tested do not completely replicate previously observed tendencies. As illustrated in Table 5, the results of the analysis of true reflexive, lexical reflexive, and true reciprocal verbs showed that there was a marginally significant difference between the production of true reflexive and true reciprocal verbs (β=1.641; z=1.773; Pr(>|z|)=.076.), whereas there was no difference between lexical reflexive and true reciprocal verbs (β=.477; z= .447; Pr(>|z|)=.654). The effect of verb length was significant (β=-.764; z=-2.041; Pr(>|z|)=.041*).

Random effects			*Variance*	*SD*
Subject : Intercept			.573	.757
Stimuli : Intercept			.754	.868
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	1.327	.781	1.699	.089
Trial Order	.026	.030	.869	.384
Verb Frequency	.252	.487	.517	.605
Verb Length	-.764	.374	-2.041	.041*
Verb Type (lexical reflexive)	.477	1.066	.447	.654
Verb Type (true reflexive)	1.641	.925	1.773	.076.

Table 5 – Differences in the production of true reflexive, lexical reflexive, and true reciprocal verbs at the age of 5

On the other hand, the analysis of true reflexive, lexical reflexive and anti-causative verbs (Table 6) did not result in any significant differences in the oldest group tested.

Random effects			*Variance*	*SD*
Subject : Intercept			1.795e-07	.000
Stimuli : Intercept			6.582e-01	.811
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	.877	1.036	.847	.397
Trial Order	.052	.030	1.722	.085.
Verb Frequency	.054	.464	.117	.907
Verb Length	-.399	.665	-.601	.547
Verb Type (lexical reflexive)	.367	1.625	.226	.821
Verb Type (true reflexive)	.934	1.470	.636	.525

Table 6 – Differences in the production of true reflexive, lexical reflexive, and anti-causative verbs at the age of 5

Whereas there was again no difference between the production of true reflexive and lexical reflexive verbs (β=-.791; z=-.595; Pr(>|z|)=.551), or true reciprocal and lexical reciprocal verbs (β=-1.193; z=-.842; Pr(>|z|)=.400), the difference between the production of true reciprocal and anti-causative verbs was significant, in favour of reciprocal verbs (β=3.095; z=2.998; Pr(>|z|)=.002**). Moreover, verb length was significant as well (.000***). For more details see Appendix 3c.

3.6.5. Development of production per verb type

The production of true reflexive verbs, shown in Figure 3, was high in all the three groups. In the group of three-year-olds, the production was 67% (36/54 verbs), in the group of four-year-olds it was 78% (42/54 verbs), while it reached 93% (50/54 verbs) in the oldest group. The GLMER analysis has shown that there is a significant difference in the production of true reflexive verbs between the ages of three and five (β=-2.287; z=-2.737; Pr(>|z|)=.006**), and a marginal difference between the ages of four and five (β=-1.567; z=-1.872; Pr(>|z|)=.061.). For more details see Appendix 3d.

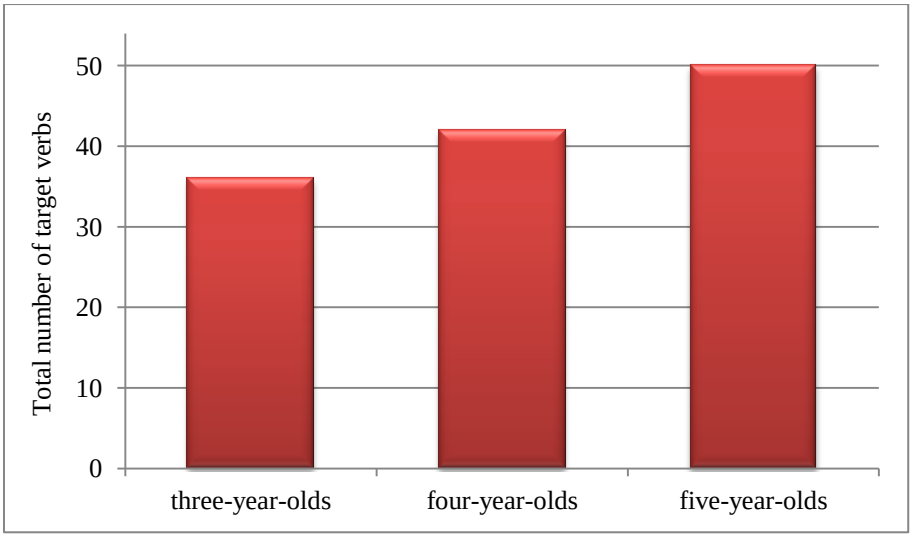


Figure 3 – True reflexive verb production across groups in the pilot study

The production of lexical reflexive verbs was the most successful and evenly distributed one, in comparison with other tested types of *se*-verbs. In the first two groups it was 78% (42/54 verbs), while in the third age group it reached 89% (48/54 verbs). The differences in the production between the groups were not significant (between the ages of five and three - β=.944; z=1.579; Pr(>|z|)=.114; between the ages of four and three - β=.001; z=.003; Pr(>|z|)=.997), which could imply that this kind of *se*-verbs is acquired first (for the complete table with results see Appendix 3d). The production of lexical reflexive verbs across groups is shown in Figure 4.

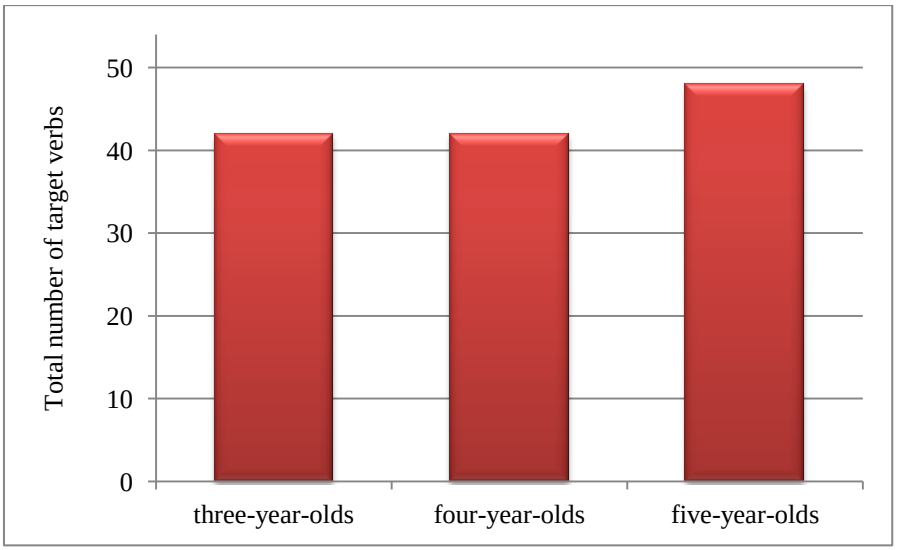


Figure 4 – Lexical reflexive verb production across groups in the pilot study

The production of true reciprocal verbs was much less successful in comparison with true and lexical reflexive verbs. In the first group, the production was twice as low – it was only 37% (20/54 verbs). It improved in the second group and reached 59% (32/54 verbs), while in the third group it reached 74% (40/54 verbs). The results are presented in Figure 5. The GLMER analysis (given in Appendix 3d) has shown that there is a marginally significant difference in the production of true reciprocal verbs between the ages of four and three (β=1.782; z=1.825; Pr(>|z|)=.067.), as well as a significant difference between the ages of five and three (β=3.099; z=2.923; Pr(>|z|)=.003**).

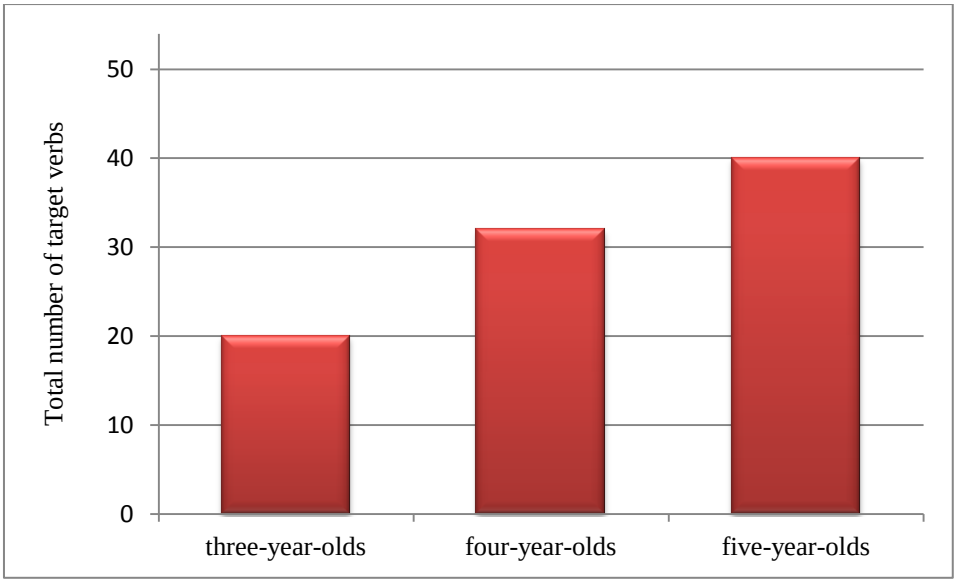


Figure 5 – True reciprocal verb production across groups in the pilot study

The production of lexical reciprocal verbs was the lowest out of all the tested verb types. In the group of three-year-olds, it was only 20% (11/54 verbs). Among four-year-olds it slightly improved and reached 33% (18/54 verbs), while in the group of five-year-olds it almost doubled and reached 56% (30/54 verbs). The GLMER analysis (provided in Appendix 3d) has shown that there is a statistically significant difference in the production of lexical reciprocal verbs between the ages of three and five (β=-2.011; z=-2.998; Pr(>|z|)=.002**), as well as a marginally significant difference between the ages of four and five (β=-1.186; z=-1.915; Pr(>|z|)=.055.). This is shown in Figure 6.

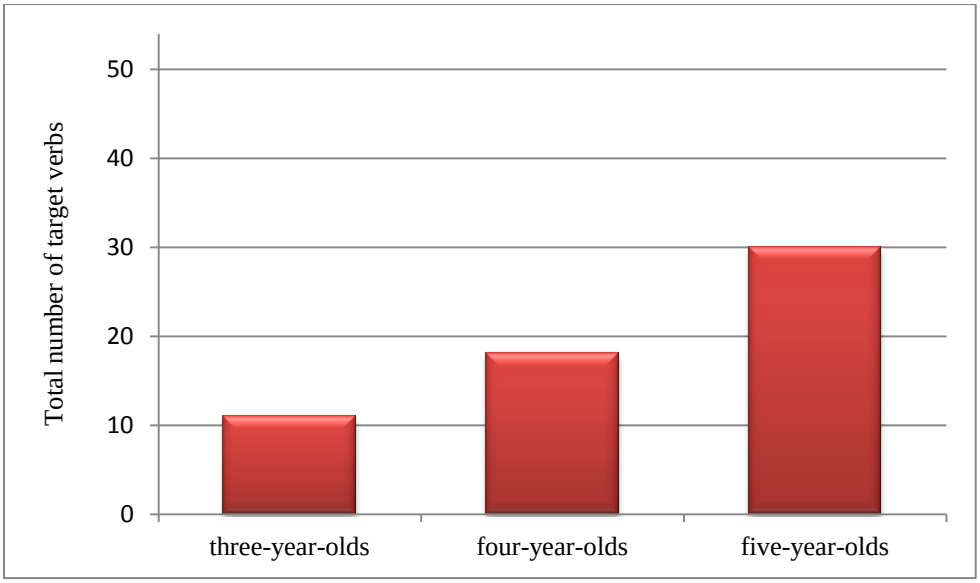


Figure 6 – Lexical reciprocal verb production across groups in the pilot study

Finally, the production of anti-causative verbs was only slightly better than the production of lexical reciprocal verbs, which suggests that these two types of *se*-verbs are the most difficult to produce, i.e. they are the last to be acquired. In the group of three-year-olds, the production was only 19% (10/54 verbs). In the group of four-year-olds, it improved and reached 35% (19/54 verbs), while in the group of five-year-olds it doubled and reached 72% (39/54 verbs). The GLMER analysis has shown that there is a statistically significant difference in the production of anti-causative verbs between all the tested ages: three and five (β=-2.923; z=-5.039; Pr(>|z|)=.000***), four and three (β=1.007; z=1.987; Pr(>|z|)=.046*), and four and five (β=-1.916; z=-3.802; Pr(>|z|)=.000***). For more details see Appendix 3d. The production of anti-causative verbs across groups is presented in Figure 7.

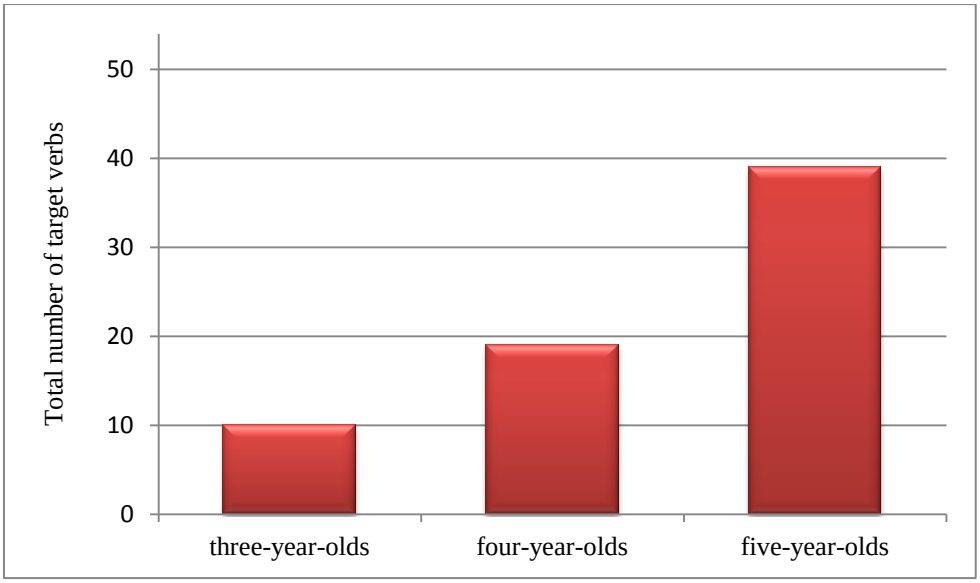


Figure 7 – Anti-causative verb production across groups in the pilot study

3.6.6. Non-target answers

After the data were analysed statistically, non-target answers were qualitatively analysed. They were divided into seven categories, as described in Section 3.2. All the non-target answers are given in Appendix 4.

As it can be seen in Table 7, the majority of non-target answers for true reflexive verbs were transitive verbs with complements (12/34 non-target answers) or non-target verbs (11/34 non-target answers). The number of verbs with complements points towards these children's tendency to the use of transitive verbs. There were no mistakes that would include the presence of both the clitic *se* and an object (e.g. **ona se češlja kosu* 'she *se* is combing her hair'), which suggests that children are sensitive to the difference between reflexive and transitive verb forms from the earliest age. When it comes to the non-target verbs that were used instead of true reflexive verbs, they were either transitive or reflexive, but their meanings were inadequate for the depicted situation. Therefore, they could not be coded as target. The clitic was omitted only twice, and a noun was used only once. The children did

not provide any answer eight times. The number of non-target answers decreased across the age groups, and totalled only four in the oldest group tested.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	5 *prska* spray.3sg.pres 'he is spraying' instead of *umiva se* 'he is washing his face'	5 *čisti* clean.3sg.pres 'he is cleaning' instead of *brije se* 'he is shaving'	1 *skida zube* take off.3sg.pres teeth.acc 'he is taking off his teeth' instead of *brije se* 'he is shaving'	11
Transitive verbs Example	7 *oblači trenerke* put on.3sg.pres tracksuits.acc 'he is putting on tracksuits' instead of *oblači se* 'he is dressing'	3 *brije bradu* shave.3sg.pres beard.acc 'he is shaving his beard' instead of *brije se* 'he is shaving'	2 *češlja kosu* comb.3sg.pres hair.acc 'she is combing her hair' instead of *češlja se* 'she is combing herself'	12
Target verbs without the clitic *se* Example	1 *kupa* bathe.3sg.pres transitive 'bathe' instead of *kupa se* 'she is bathing'	/	1 *brije* shave.3sg.pres transitive 'shave' instead of *brije se* 'he is shaving'	2
Made-up verbs	/	/	/	0
Nouns Example	1 *lice* 'face' instead of *wash one's face*	/	/	1
Other	/	/	/	0
No answer	4	4	/	8
Total number of non-target answers:	18	12	4	34

Table 7 – Non-target answers for true reflexive verbs across groups in the pilot research

The number of non-target answers for lexical reflexive verbs was the lowest in comparison with other verb types (30). Table 8 shows that 50% of non-target answers were non-target verbs. The participants often used a transitive verb instead of the lexical reflexive one (e.g. *pravi krug* 'she is making a circle' instead of *vrti se* 'she is spinning'), which again points towards their tendency for the use of transitive verbs. There were two instances of using verbs with complements instead of lexical reflexive verbs. An interesting answer was given by a participant from the oldest group tested who used the transitive variant of the verb *igrati se* 'play' with an object that cannot be noted in the language of adults (*igraju dvorac od peska* 'they are playing a sand castle'). In some cases, children preferred to use the adverb *ovako* 'like this', accompanied by an imitation of the presented activity, or copular constructions with adjectives (e. g. *srećan je* 'he is happy' instead of *smeje se* 'he is laughing'). There were no cases of the omitted clitic *se* or uses of nouns instead of verbs, both of which were noted with true reflexive verbs. The children gave no answer on six occasions. The number of non-target answers was the same in the first two groups, and it was twice as low in the oldest group tested.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	8 *pravi krug* make.3sg.pres circle.acc 'she is making a circle' instead of *vrti se* 'she is spinning'	6 *plače* cry.3sg.pres 'she is crying' instead of *uplašila se* 'she got scared'	1 *prave peščani zamak* make.3pl.pres sand.adj castle.acc 'they are making a sandcastle' instead of *igraju se* 'they are playing'	15
Transitive verbs Example	/	/	2 *igraju dvorac od peska* play.3pl.pres castle.acc of sand.gen 'they are playing a sand castle' instead of *igraju se* 'they are playing'	2
Target verbs without the clitic *se*	/	/	/	0
Made-up verbs	/	/	/	0
Nouns	/	/	/	0
Other Example	1 *ona ovako* she.nom like this.adv 'she like this' instead of *vrti se* 'she is spinning'	4 *rasplakana* teary.adj.fem 'teary' instead of *uplašila se* 'she got scared'	2 *srećan je* happy.adj.masc is 'he is happy' instead of *smeje se* 'he is laughing'	7
No answer	3	2	1	6
Total number of non-target answers:	12	12	6	30

Table 8 – Non-target answers for lexical reflexive verbs across groups in the pilot research

The number of non-target answers for true reciprocal verbs was twice as high as the number of non-target answers for true and lexical reflexive verbs (70 vs. 34 vs. 30). The majority of non-target answers belonged to the category of non-target verbs (45/70 non-target answers). However, the complexity of those verbs varied. In some cases, the participants described different activities instead of the target ones, when they could not name the depicted situation (e.g. *stoje* 'they are standing' instead of *gledaju se* 'they are looking at each other'). Most frequently, they would replace the target true reciprocal verb with a 3rd person plural form of an unergative or transitive verb (e.g. *trče* 'they are running' instead of *jure se* 'they are chasing each other'). There was also one made-up verb. From the example given in Table 9, produced by a participant from the youngest group, it can be seen that the verb *bacati se* 'throw oneself' was used as if it were a reciprocal verb (instead of the target *gađaju se* 'they are throwing something at each other'). In Serbian, this verb can only have a reflexive reading, in which a person is throwing himself/herself on a surface, but not a reciprocal one. As it is stated in *Rečnik srpskoga jezika* [the Dictionary of the Serbian Language] (2011: 64), this verb is synonymous with: *praćakati se* 'wiggle', *trzati se* 'twitch', *koprcati se* 'squirm', all of which describe a series of sudden body movements. A transitive variant of the target reciprocal verb was noted only once, in the case of the verb *gledati se* (*gledaju oči* 'they are looking at eyes'). The clitic s*e* was omitted four times, and two nouns were used instead of the target verbs. The children did not give any answer seventeen times, which also speaks of the difficulty of these verbs.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	22 *grle se* hug.3pl.pres SE 'they are hugging each other' instead of *ljube se* 'they are kissing each other'	13 *stoje* stand.3pl.pres 'they are standing' instead of *gledaju se* 'they are looking at each other'	10 *trče* run.3pl.pres 'they are running' instead of *jure se* 'they are chasing each other'	45
Transitive verbs Example	1 *oči gledaju* eyes.acc look.3pl.pres 'they are looking at eyes' instead of *gledaju se* 'they are looking at each other'	/	/	1
Target verbs without the clitic *se* Example	1 *ljube* kiss.3pl.pres 'they are kissing' instead of *ljube se* 'they are kissing each other'	1 *tuce* beat.3sg.pres 'he is beating' instead of *tuku se* 'they are fighting with each other'	2 *gledaju* look.3pl.pres 'they are looking' instead of *gledaju se* 'they are looking at each other'	4
Made-up verbs Example	1 *bacaju se* throw.3pl.pres SE'they are throwing themselves' instead of *gađaju se* 'they are throwing something at each other'	/	/	1
Nouns Example	/	2 *loptice* 'balls' instead of *gađaju se* 'they are throwing something at each other'	/	2
Other	/	/	/	0
No answer	9	6	2	17
Total number of non-target answers:	34	22	14	70

Table 9 – Non-target answers for true reciprocal verbs across groups in the pilot research

The number of non-target answers for lexical reciprocal verbs was the highest out of all the tested verb types (103). Once again, the majority of non-target answers belonged to the category of non-target verbs (68/103 non-target answers), which can be seen in Table 10. The verbs that the participants used most often were 3rd person plural unergative or transitive verbs (e.g. *trče do cilja* 'they are running towards the finish line' instead of *trkaju se* 'they are racing'). They would also use true reciprocal verbs instead of the lexical ones (e.g. *pozdravljaju se* 'they are saying hello to each other' instead of *rukuju se* 'they are shaking hands' or *udarili se* 'they hit each other' instead of *sudarili su se* 'they collided'*)*. There were four made-up verbs in total. The verb *ratuju se* 'they are waging war SE' was used instead of *mačevati se/boriti se* 'fence/fight', although this verb cannot appear with the clitic *se* in Serbian. What should be added is that the incorrect reciprocal use of the verb *bacati* 'throw' was noted again. This time one of the participants from the youngest group used it instead of the verb *dobacivati se* 'throw a ball at each other', which suggests that children have not completely acquired the meaning of the given verb and eliminated its reciprocal usage at this stage of language acquisition. The clitic *se* was omitted twice, and nouns were used instead of verbs four times. The children even used onomatopoeia to depict the presented situation, which was categorised as 'other'. There were four answers in total in that category. The participants did not provide any answer twenty one times, which points to the complexity of these verbs.

Non-target answers	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	25 *kažu zdravo* say.3pl.pres hello.acc 'they say hello' instead of *rukuju se* 'they are shaking hands'	24 *trče do cilja* run.3pl.pres to finishline.gen 'they are running towards the finish line' instead of *trkaju se* 'they are racing'	19 *viču* yell.3pl.pres 'they are yelling' instead of *svađaju se* 'they are arguing'	68
Transitive verbs	/	/	/	
Target verbs without the clitic *se* Example	/	1 *sudarili* collided.pl 'collided' instead of *sudarili su se* 'they collided'	1 *sudarili* collided.pl 'collided' instead of *sudarili su se* 'they collided'	2
Made-up verbs Example	2 **bijaju se* instead of *mačuju se* 'they are fencing'	/	2 *ratuju se* wage war.3pl.pres SE 'they are waging war' instead of *mačuju se* 'they are fencing'	4
Nouns Example	2 *sudar* 'collision' instead of *sudarili su se* 'they collided'	2 *loptom* ball.inst 'with the ball' instead of *dobacuju se* 'they are throwing a ball at each other'	/	4
Other Example	2 onomatopoeia *aaa* instead of *svađaju se* 'they are arguing'	2 *oni su sec* they.nom are snip 'they are snip' instead of *mačuju se* 'they are fencing'	/	4
No answer:	12	7	2	21
Total number of non-target answers:	43	36	24	103

Table 10 – Non-target answers for lexical reciprocal verbs across groups in the pilot research

The number of non-target answers for anti-causative verbs was only slightly lower (94). As it can be seen in Table 11, the children most often used a non-target answer categorised as 'other' for this type of *se*-verbs (41/94). The answers belonging to this category were mostly adjectives, or copular constructions with adjectives (e.g. *je svetleća* 'is flashy' instead of *upalila se* 'it turned on'). Non-target verbs were frequently produced as well (33/94), and they point to the children's tendency to come up with an implicit Agent, which was not presented in the stimulus. In most of the cases, the participants would use a transitive verb instead of an anti-causative one, even though the question that they were asked was always Patient-focused ("What happened?"). Some of the non-target verbs they used were unaccusative, which points to the similarity between these two verb types (e.g. *sija* 'it glows' instead of *upalilo se* 'it turned on'). One of the participants used a transitive variant of the verb (*moraš da zatvoriš* 'you must close' instead of *zatvorila su se* 'the door closed'). The clitic was omitted three times, and nouns were used instead of verbs three times as well. The participants did not give any answer thirteen times.

Non-target answers	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	17 *uđemo* come in.1pl.pres 'we come in' instead of *zatvorila su se* 'it closed'	10 *mogli su da vide* can.3pl.past to see.3pl.present 'they could see' instead of *upalilo se* 'it turned on'	6 *neko je duvao* someone.nom blow.3sg.masc.past 'someone blew' instead of *ugasila se* 'it went out'	33
Transitive verbs Example	/	1 *moraš da zatvoriš* must.2sg.pres to close.2sg.pres 'you must close' instead of *zatvorila su se* 'it closed'	/	1
Target verbs without the clitic *se* Example	1 *otvorila* opened.fem.adj 'opened' instead of *otvorila se* 'it opened'	2 *upalila* turned on.fem.adj 'turned on' instead of *upalilo se* 'it turned on'	/	3
Made-up verbs	/	/	/	0
Nouns Example	1 *laku noć* 'good night' instead of *spojile su se* 'they merged'	1 *sat* 'clock' instead of *spojile su se* 'they merged'	1 *jedna kazaljka* 'one hand' instead of *spojile su se* 'they merged'	3
Other Example	17 *otvorena* open.adj 'open' instead of *otvorila se* 'it opened'	17 *pokvaren je* broken.adj is 'it is broken' instead of *pokvario se* 'it stopped working'	7 *je svetleća* is flashy.adj 'it is flashy' instead of *upalilo se* 'it turned on'	41
No answer	8	4	1	13
Total number of non-target answers:	44	35	15	94

Table 11 – Non-target answers for anti-causative verbs across groups in the pilot research

3.7. Discussion

3.7.1. Observed tendencies

The results of the pilot research suggest that reflexive verbs (both true and lexical) are acquired before reciprocal and anti-causative verbs, as predicted by the initial hypothesis. In the youngest group tested, they were produced significantly better than the other two verb types. Both true and lexical reflexive verbs were also produced better than anti-causative verbs in the group of four-year-olds, and true reflexive verbs were produced with greater success than true reciprocal verbs in the group of five-year-olds. The reason why some of the differences did not reach the level of significance could be contributed to a rather loose age range, as well as to a small number of observations.

Moreover, separate GLMER analyses of production per verb type showed that there was no difference in the production of lexical reflexive verbs between any of the tested ages, which indicates that this could be the first type of *se*-verbs to be acquired. On the other hand, the differences in the production of anti-causative verbs between all the tested age groups were significant, which could indicate that they are acquired last.

However, all the results need to be taken with caution due to a very limited number of participants. We expect the observed tendencies to be much more prominent, and possibly some new contrasts to appear in the main research, due to a much larger number of participants, more evenly distributed age range and improvements made to the stimuli. The necessary improvements of the instrument will be discussed in more detail in Section 3.7.3.

3.7.2. Implications

The two most successfully produced verb types were true reflexive and lexical reflexive verbs. The obtained data confirm that the clitic *se* and the reflexive pronoun *sebe* ‘self’ do not have the same distribution in the production of true reflexive *se*-verbs. Not a single case of

using a verb with the full form of the reflexive pronoun *sebe* 'self' was noted in the children's answers for target true reflexive verbs. The children often replaced the clitic *se* with different noun phrases in the accusative case instead (e.g. *oblači majicu* 'he is putting on a T-shirt', *umiva lice* 'he is washing his face', *češlja kosu* 'she is combing her hair'). Moreover, the data suggest that children do not combine reflexive verbs with direct objects in the process of first language acquisition, which suggests that children are sensitive to the difference between transitive and reflexive verb forms from the earliest tested age. The children's non-target answers for true reflexive verbs confirm that children perceive the given situations as transitive, which points to the similarity between reflexive and transitive verbs in terms of the existence of two thematic roles – the Agent and Patient; actually, that is the only condition that reflexive verbs fulfil regarding transitivity (Arsenijević 2011).

As far as lexical reflexive verbs are concerned, it is important to mention that there were no instances of clitic omission. A possible reason for that could be that while true reflexive verbs often alternate with their transitive variants in the language of adults, that is either rarely the case with lexical reflexive verbs (such as *igrati se* 'play'), or it never happens with completely lexicalised verbs (such as *penjati se* 'climb').

When it comes to true reciprocal verbs, whose production was somewhere in between true and lexical reflexive verbs on the one hand, and lexical reciprocal and anti-causative verbs on the other, an important developmental characteristic of their usage was noted. A lot of true reciprocal verbs that were produced were used in the 3rd person singular instead of the 3rd person plural form, which has been claimed to be the default verb form in the child speech in Serbian (Mandić, 2013).

The production of lexical reciprocal verbs was less successful than the production of true reciprocal verbs (although the difference was not statistically significant), and the reason for that might be their lower frequency in child-directed language. As it has been mentioned

before, there was no way to check their frequency in child language. Lemma frequency (taken from srWaC), was not significant as a covariable, but the reason for that might be that frequency in child language is not the same as frequency in adult language. The clitic was omitted only twice, both times with the verb *sudariti se* 'collide', which is similar to the verb *udariti* 'hit', which is a transitive verb. The qualitative analysis of non-target answers has shown that children would often use unergative or transitive verbs instead of lexical reciprocal ones, where two Agents perform an activity together, instead of two Agents performing and going through an activity at the same time. This finding corresponds to the description of lexical reciprocal verbs given in Section 2.1.3.

Finally, the statistical analyses have shown that the differences in the production of anti-causative verbs were significant between all the tested ages, which points to the difficulty with this type of *se*-verbs. The non-target answers have shown that children tend to use transitive verbs or copular constructions with adjectives instead of anti-causatives. However, a larger sample is needed in order to determine whether the reason for the lower production of anti-causative verbs should be looked for in the children's inability to perform A-movement, or in the semantic complexity of the construction in which the Cause theta-role is eliminated.

3.7.3. Necessary improvements for the main research

The main reason for conducting the pilot research was to check the validity of the stimuli. We checked whether the activities and events were presented in a straightforward manner, without the inclusion of any unnecessary details which could prompt the children to provide different answers. All the stimuli that proved to be problematic are given in Appendix 5a. All the remaining stimuli, together with the replacements of the problematic stimuli that were used in the main research are given in Appendix 5b.

A few drawings proved to be ambiguous in the pilot research and, therefore, open to multiple interpretations in the group of lexical reflexive verbs. The stimulus for the verb *igraju se* 'they are playing' elicited different responses in the pilot research: *prave kulu od peska/dvorac/peščani zamak* 'they are making a sand tower/castle'; *kopaju* 'they are digging'. For that reason, we decided to make a new stimulus showing a girl playing with toys, which would reduce the possibility of different interpretations. Another stimulus that was replaced before the main research began was the one that tested the verb *vrteti se* 'spin', which proved to be problematic because some children would focus on the boy who was also presented in the stimulus. Instead of saying *devojčica se vrti* 'the girl is spinning', some of the children said: *on je stavio nešto u kosu* 'he put something in her hair' or *dečak je vrti* 'the boy is spinning her'. For that reason, we decided to make a new stimulus that would depict only one person – a ballerina spinning.

Three stimuli that tested the production of true reciprocal verbs also needed replacement. Firstly, the verb *juriti se* 'chase each other', for which the most common non-target answer was *trče* 'they are running', was not clear enough for the children to produce the target answer, so it had to be drawn again. Secondly, the stimulus for the verb *gađati se* 'throw something at each other' elicited numerous non-target answers, the most common of which was *bacaju loptice* 'they are throwing balls'. The two children were drawn too close to each other for the stimulus to clearly represent the act of throwing little balls at each other, and therefore it needed a replacement. Finally, the verb *gledati se* 'look at each other' yielded different non-target answers, such as *viču* 'they are yelling', *razgovaraju* 'they are talking', *stoje* 'they are standing', *smeju se* 'they are laughing', all of which pointed to the flaws in the stimulus itself. The characters in the drawing were indeed standing, with their mouths open, which prompted the children to give such answers. For that reason, we needed a new

stimulus, depicting only the upper parts of the children's bodies, with sharp focus on their eyes.

Lastly, in the group of anti-causative verbs, the stimulus for the verb *zatvoriti se* 'close' was ambiguous for some children who thought that there was something wrong with the door: *idu krivo* 'they go aslope'; **se iskrivena* 'SE bent'; hence, a clearer stimulus needed to be drawn.

Apart from the improvements made to the drawings, some of the target-verbs had to be replaced as well. Although the production of the verb *uplašiti se* 'get scared' was quite successful (except for the cases when the children would say that the girl was crying or that she was sad), we decided to replace it in the main research because it was the only psychological verb (which assigns the Experiencer theta-role) among lexical reflexive verbs. It was replaced with the verb *spuštati se* 'slide'. Similarly, although the stimulus for the verb *brijati se* 'shave oneself' was clear, the results of the pilot research showed that a considerable number of children were not familiar with that activity. Their answers varied: *čisti* 'he is cleaning'; *briše se* 'he is drying himself'; *skida zube* 'he is taking off his teeth'. For that reason, this verb was replaced with the verb *brisati se* 'dry oneself'. Another verb that was tested with an unambiguous stimulus, but was difficult to produce, was the verb *spojiti se* 'merge'. The reason for this is that children at a young age are probably not familiar with the concept of clock-hands being apart or overlapped. This verb was replaced with the verb *polomiti se* 'break'.

4. MAIN RESEARCH

4.1. Paticipants

A total of sixty (N=60) monolingual Serbian-speaking participants belonging to three age groups (twenty participants in each), which correspond to the age groups tested in the pilot study, took part in the main research. The age range in the youngest group was 31–42 months (N=20, M= 37.75, SD= 2.88). The age of around three was chosen as the starting point because that age is recognized as the earliest age for testing children (Eisenbeiss, 2010). Moreover, in the research conducted by Ilić (2015), it was shown that anti-causative verbs were first produced in the 31–33-month-old group, which was exactly the age of the youngest participant in this study. Finally, we tried to conduct the experiment with 2-year-old children, but it was impossible because of their lack of attention to the task. There were thirteen girls and seven boys tested. The age range in the next group was 43–54 months (N=20, M=50.65, SD=2.99), and it was 56–68 months in the oldest group (N=20, M=61.55, SD=4.19). Twelve girls and eight boys were tested in the middle group, whereas the number of boys and girls was equal in the oldest group. Gender was not controlled for in the research. The three groups will hereupon be referred to as three-year-olds, four-year-olds. and five-year-olds, respectively, even though the age range encompassed an 11 or a 12-month difference between the youngest and the oldest participant within one group.[11]

None of the participants had any language impairment, learning disability, or visual or hearing loss. Kindergarten teachers provided all the children's relevant information (the child's birth date, information about their mother tongue and health status). The study was approved by the Ethics Committee at the Faculty of Philosophy, University of Novi Sad. The children were tested in February 2019, in "Maslačak" kindergarten, "Radosno detinjstvo"

[11] The age range of the groups was largely determined by the children's grouping in the kindergarten. Reducing the age range would inevitably lead to a decrease in the number of participants. On the other hand, a different grouping of the tested children, i.e. organizing them into more age groups with fewer participants could lead to obscuring the results due to greater individual variance.

preschool facility in Novi Sad. The procedure is described in detail in the procedure section below.

4.2. Design

The first independent variable was verb type with two or three levels, depending on the analysed data set (see Section 4.6. for more details). GLMER analyses were conducted for each of the three age categories separately in order to establish the differences in the production at different stages of first LA (fifteen analyses in total). In the second part of the research, the independent variable was age with three levels (three-year-olds, four-year-olds, and five-year-olds), while the verb type was kept stable (five analyses in total). Participants and stimuli were used as random effects. The effects of verb length and frequency were also examined as covariables. The lemma frequencies of target verbs were taken from the *Serbian Web Corpus* (s*rWaC*) (Ljubešić–Klubička, 2016) as their frequencies in child language could not be explored. Verb length was quantified by counting the number of letters.

The dependent variable in the main study was verb production coded as 'target' or 'non-target'. 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. 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. Self-corrections were allowed, as they are known to be a common strategy in L1 acquisition (Ingram, 1989).

Non-target answers were coded in the way defined in Section 3.2., and repeated here:

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. Transitive verbs instead of variants with the clitic *se* (e.g. *umiva lice* 'he is washing his face' instead of *umiva se*)
3. Target verbs without the clitic *se* (e.g. *kupa* instead of *kupa se* 'bathe')
4. Made-up verbs (including existing verbs used with a different valency)
5. Nouns
6. Other (adjective *otvorena* 'open' instead of the verb *otvoriti se* 'open')
7. No answer.

The design was the same in the first and in the follow-up experiment.

4.3. Stimuli

Five verb types that were tested in the experiment were true reflexive verbs, lexical reflexive verbs, true reciprocal verbs, lexical reciprocal verbs, and anti-causative verbs (in accordance with their categorization given in Section 2.1.4). Six verbs were chosen per verb type, which makes a total of 30 target verbs presented to each participant. The distinction between true reflexive and lexical reflexive verbs was determined by respecting the criterion of the interchangeability of the clitic *se* and the reflexive pronoun *sebe* 'self'. The distinction between true reciprocal and lexical reciprocal verbs was determined by respecting the criterion of the interchangeability of the clitic *se* and the reciprocal *jedan drugog* 'each other'. Anti-causatives were chosen with respect to the detransitivisation process and the absence of +Cause theta-role. We tried to include verbs which denote familiar daily activities, some of them found in Anđelković's (2012) inventory of verbs produced at the age of 18 months (e.g. *kupati* 'bathe', *ljuljati* 'swing', *udariti* 'hit', *otvoriti* 'open' all in their transitive forms), and which could be easily represented in the stimuli at the same time. The tested verbs were as follows:

1. true reflexive verbs: *oblačiti se* ‘dress’, *umivati se* ‘wash one’s face’, *brisati se* ‘dry oneself’, *kupati se* ‘bathe’, *češljati se* ‘comb oneself’, *šminkati se* ‘put on make-up’;
2. lexical reflexive verbs: *igrati se* ‘play’, *penjati se* ‘climb’, *vrteti se* ‘spin’, *ljuljati se* ‘swing’, *spuštati se* ‘slide’, *smejati se* ‘laugh’;
3. true reciprocal verbs: *grliti se* ‘hug each other’, *ljubiti se* ‘kiss each other’, *tući se* ‘fight with each other’, *juriti se* ‘chase each other’, *gađati se* ‘throw something at each other’, *gledati se* ‘look at each other’;
4. lexical reciprocal verbs: *svađati se* ‘argue’, *trkati se* ‘race’, *mačevati se/boriti se* ‘fence/fight’, *rukovati se* ‘shake hands’, *dobacivati se* ‘throw a ball at each other’, *sudariti se* ‘collide’;
5. anti-causative verbs: *otvoriti se* ‘open’, *zatvoriti se* ‘close’, *upaliti se* ‘turn on’, *ugasiti se* ‘go out’, *pokvariti se* ‘stop working’, *polomiti se* ‘break’.

In addition to the five verb types tested, a few filler stimuli were also used. Their number was not great, due to limitations regarding children’s attention span and their willingness to participate in the experiment. However, as Ambridge–Rowland (2013) claim, not using fillers in elicited production tasks does not represent a problem, since it can only increase the children’s attempts at the production of the target construction.

After necessary corrections were made, visual stimuli (drawings) were used to elicit target verbs. The characters presented in the stimuli were four family members and their friends, doing daily activities, which provided the necessary context for children. In the case of anti-causatives, some events that commonly occur within a household were depicted (e.g. the door closing). By opting for daily activities and events from everyday life, we intended to ensure the communicative sense of the task. As Ambridge–Rowland (2013) suggest, this is a crucial part in designing an elicited production task.

4.4. 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. The parental consent form is given in Appendix 1. The data collection technique was a verb elicitation task. Sixty participants were tested in single sessions that lasted around 10 minutes per participant.

Each child was tested individually, in one of the rooms provided by the kindergarten staff. Therefore, the sound quality was much better than in the pilot research. The only people present were the interviewer and the interviewee. There were no cases of the kindergarten teacher being present as well (as was the case in the pilot research) because the interviewer spent more time with the children prior to the experiment, so that they would get used to her. 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 a question or started talking about a different topic. Some children also needed additional encouragement to start responding to the given stimuli. The interviewer would encourage them to start talking by asking them a question on a familiar topic (e.g. "What do you do when you wake up in the morning?"). However, most children showed considerable interest in the experiment and it was not difficult to focus their attention on the task.

The interview procedure was exactly the same as the one outlined in Section 3.4., in both the first and the follow-up experiment.

4.5. Data Analysis

A descriptive statistical analysis was conducted first, after which the data were analysed with the Mixed Effects Logistic Regression (GLMER), in the R free statistical software (R Core Team, 2017), by using *lme4* (Bates et al., 2019) and *lmerTest* (Kuznetsova–Brockhoff–Bojesen, & Jensen, 2019) packages.

In order to pursue the first research aim outlined in Section 1.2 (test the production of five types of *se*-verbs in Serbian), five analyses of specific contrasts were conducted for each age group separately (fifteen analysis in total). First, we wanted to check if there is a difference in the production of true and lexical reflexive verbs, and true and lexical reciprocal verbs (answering the second research question), and conduct the remaining analyses on the basis of the differences found. Therefore, two analyses of the production of verb types on two levels were conducted: one comparing the production of true and lexical reflexive verbs, and the other comparing the production of true and lexical reciprocal verbs. Since the results in the experiment showed that there was a significant difference between the production of true and lexical reflexive verbs, whereas a difference between the production of true and lexical reciprocal verbs was not found, we further conducted two analyses of the production of verb types on three levels: one comparing the production of true reflexive, lexical reflexive, and true reciprocal verbs, and the other comparing the production of true reflexive, lexical reflexive, and anti-causative verbs. These two analyses allowed us to check the initial hypothesis (that reflexive verbs would be produced more successfully than reciprocal and anti-causative verbs). We chose true rather than lexical reciprocal verbs for contrasting since we were more interested in morpho-syntactically derived forms. Moreover, there was no significant difference found between the two. Finally, there was another analysis of the production of verb types on two levels conducted, contrasting the production of true reciprocal verbs and anti-causative verbs, with the purpose of determining whether there is

any difference in the production of the two verb types which are both semantically more complex than reflexive verbs.

In addition to the five analyses conducted for each age group separately, five analyses which show the differences in the production of the same verb type between the three age groups were also conducted, which gave us an insight into the increase in the production of specific verb types.

Finally, a qualitative analysis of non-target answers was conducted, which was essential for determining the implications of this research for the analysis of the status and functions of the clitic *se* in Serbian (third research aim).

The data were analysed in the same way in the main and follow-up experiment.

4.6. Results

4.6.1. Verb production per age group

Every child was expected to 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 8, we can see that three-year-olds had no difficulty producing true reflexive verbs (N=94, M=4.7, SD=1.45) or lexical reflexive verbs (N=105, M=5.25, SD=0.85). On the other hand, the production of true reciprocal, lexical reciprocal, and anti-causative verbs was much lower. Unlike the production of true reflexive verbs, which was just below 80%, or the production of lexical reflexive verbs, which was 88%, the production of true reciprocal verbs (N=54, M=2.7, SD=0.66) and anti-causative verbs (N=50, M=2.5, SD=1.64) did not even reach 50% in the youngest group tested. The production of lexical reciprocal verbs was the lowest out of all the tested verb types (N=29, M=1.45, SD=1.28) and was below 25%.

Figure 8 shows that the production of all verb types increased in the group of four-year-olds. The production of true reflexive verbs was above 90% (N=109, M=5.45, SD=0.99), and the

production of lexical reflexive verbs was almost 100% (N=117, M=5.85, SD=0.37). However, the production of other verb types was still not as successful. The number of successfully produced true reciprocal verbs (N=81, M=4.05, SD=1.05), lexical reciprocal verbs (N=83, M=4.15, SD=1.46), and anti-causative verbs (N=78, M=3.9, SD=1.25) was similar, yet still below 70%. The greatest increase in the production was noted in the case of lexical reciprocal verbs, whose production was almost three times as high as in the group of three-year-olds.

Five-year-olds did not have difficulty producing any verb type. The production of true reflexive verbs (N=110, M=5.5, SD=0.69) and lexical reflexive verbs (N=119, M=5.95, SD=0.22) was virtually the same as the production in the group of four-year-olds. The production of other verb types improved. True reciprocal verbs (N=98, M=4.9, SD=0.85) and lexical reciprocal verbs (N=97, M=4.85, SD=0.98) were produced successfully in over 80% of the cases. The production of anti-causative verbs was the lowest (N=92, M=4.6, SD=0.99), and it was the only verb type whose production was below 80% in the oldest tested group.

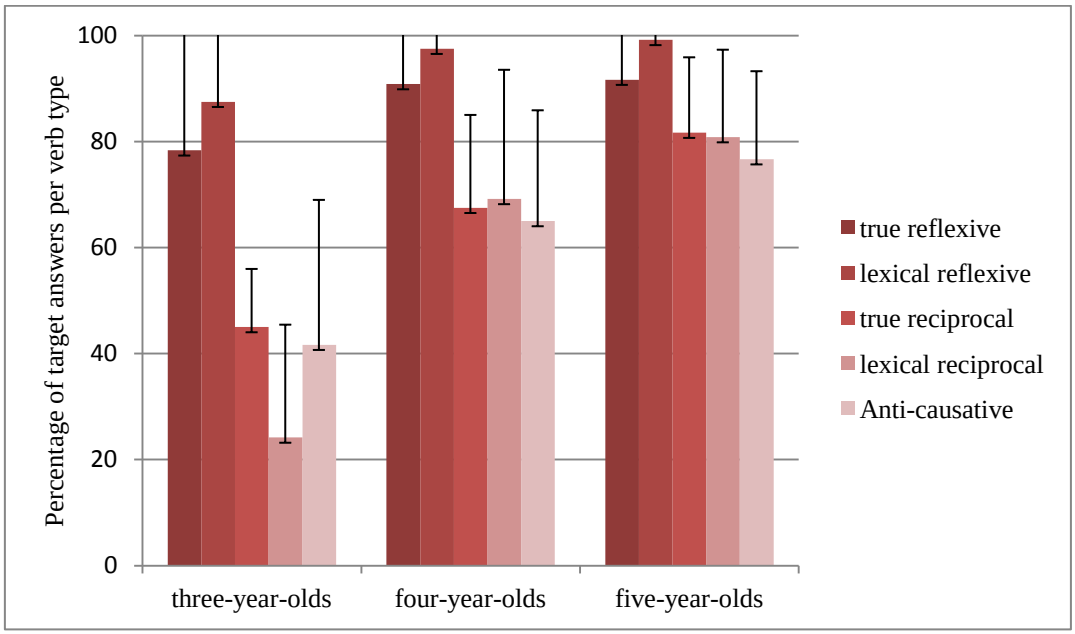


Figure 8 – Verb production per group

The data indicate that the developmental pattern of the acquisition of the tested *se*-verbs in Serbian starts with lexical reflexive and true reflexive verbs, whereas the acquisition of true

reciprocal, lexical reciprocal, and anti-causative *se*-verbs is delayed. Having reached this conclusion, we proceeded to statistical analyses conducted on the samples from the three age groups in order to determine whether the differences in the production between the five verb types would prove to be statistically significant.

4.6.1.1. Three-year-olds

The first GLMER analysis was carried out in order to determine whether there was a difference between the production of **true and lexical reflexive verbs** in the group of three-year-olds. The results suggest that lexical reflexive verbs were produced with greater success than true reflexive verbs at the age of three (β=-2.019; z=-1.850; Pr(>|z|)=.064.). The difference in the production was only marginal, but if the sample had been bigger, the verb type effect may have reached the level of significance ($p < .05$). Verb length and frequency effects were not found. The results of all the GLMER analyses with two levels of the verb type effect are provided in the form of tables in Appendix 6.

Inter-subject variability in verb production was higher in the case of true reflexive verbs (SD=1.45) than in the case of lexical reflexive verbs (SD=0.85) (SD is represented in Figure 8). As many as 80% of the participants gave four or more target true reflexive verbs (the maximum number of verbs was produced eight times, five target true reflexive verbs were given five times, and four were given three times). However, there was one child who produced only half of the target verbs, and there were three children who produced only two target true reflexive verbs. Interestingly, all of them were boys, who mostly used transitive variants of verbs instead (non-target answers will be discussed in detail in Section 4.6.3). On the other hand, the number of target lexical reflexive verbs produced per child was never lower than four. Five children produced four lexical reflexive verbs, five children produced

five, and ten three-year-olds produced all the target lexical reflexive verbs. For more details, refer to Appendix 9a.

The second GLMER analysis with two levels of the verb type effect was conducted in order to see whether a difference between the production of **true and lexical reciprocal verbs** could be found, as was the case with true and lexical reflexive verbs. However, no significant difference was found in the production of true and lexical reciprocal verbs at this age (β=.124; z=.084; Pr(>|z|)=.084)[12]. Verb length and frequency effects were not found either. Inter-subject variability was the lowest in the production of true reciprocal verbs (SD=0.66, as shown in Figure 8). As it can be seen in Appendix 9a, three-year-olds responded with three target true reciprocal verbs in 50% of the cases. Eight children produced only two target verbs, and two of them produced four. On the other hand, the variability was twice as high when it comes to the production of lexical reciprocal verbs (SD=1.28). In more than 50% of the cases, the production was either 0 (six children) or only 1 target lexical reciprocal verb (five children), which did not happen with any other verb type tested. In the remaining cases, both two and three target answers were given four times. In one case, the participant produced four target answers, which was the highest number of lexical reciprocal verbs produced in this group (Appendix 9a).

Taking into account the results for the production of true and lexical reflexive verbs, we decided to conduct further analyses with three levels of the verb type effect: true reflexive, lexical reflexive, and true reciprocal verbs, as well as true reflexive, lexical reflexive, and anti-causative verbs, for each of the tested age groups separately.

The results of the first GLMER analysis comparing the production of **true reflexive, lexical reflexive, and true reciprocal verbs** presented in Table 12 show that true reciprocal verbs were produced less successfully than lexical reflexive verbs (β=-4.095; z=-2.793;

[12] Although this could be interpreted as a marginal statistical difference, it was not detected by the model.

Pr(>|z|)=.005**). After changing the level of the verb type variable in the GLMER model, it was shown that true reciprocal verbs were produced less successfully than true reflexive verbs as well (β=-2.623; z=-2.315; Pr(>|z|)=.020*) (see Appendix 6a). The difference between the production of true reflexive verbs and lexical reflexive verbs was not found (β=-1.471; z=-1.005; Pr(>|z|)=.314).

Random effects			*Variance*	*SD*
Subject : Intercept			.973	.986
Stimuli : Intercept			2.910	1.705
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reflexive)	2.947	1.128	2.612	.009**
Trial Order	.025	.021	1.193	.232
Verb Length	-.673	.479	-1.403	.160
Verb Frequency	-.587	.603	-.974	.330
Verb Type (true reflexive)	-1.471	1.464	-1.005	.314
Verb Type (true reciprocal)	-4.095	1.466	-2.793	.005**

Table 12 – True reflexive, lexical reflexive, and true reciprocal GLMER analysis on the sample of 3-year-olds

The results of the first GLMER analysis comparing the production of **true reflexive, lexical reflexive, and anti-causative verbs** presented in Table 13 show 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**). The difference between the production of lexical reflexive and true reflexive verbs was only marginal (see Appendix 6a), which confirmed the GLMER analysis of the production of true and lexical reflexive verbs.

Random effects			*Variance*	*SD*
Subject : Intercept			.535	.731
Stimuli : Intercept			.374	.612
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	-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 13 – True reflexive, lexical reflexive, and anti-causative GLMER analysis on the sample of 3-year-olds

The production of anti-causative answers showed considerable variation in the group of three-year-olds, which was the highest among the tested verb types (SD=1.64, as shown in Figure 8). On average, this group of children produced the target anti-causative verb in about 50% of the cases. As shown in Appendix 9a, two children produced four target verbs each, six children produced three target verbs each, and three children produced two target answers each. The exceptions to this were three children who did not produce any anti-causative 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 anti-causative verbs in this group.

The final GLMER analysis was conducted in order to compare the production of **true reciprocal and anti-causative verbs**, which are both semantically more complex than reflexive verbs. No significant difference was found at the age of 3 (β=2.400; z=1.694; Pr(>|z|)=.090). We did find a verb length effect (β=-1.556; z=-2.038; Pr(>|z|)=.041*), but since it was not significant in 80% of the analyses,[13] it could be concluded that the effect of verb length is not stable.

4.6.1.2. Four-year-olds

The GLMER analysis comparing the production of **true and lexical reflexive verbs** suggests that there was no difference in the production of these two verb types at the age of four (β=1.188; z=1.152; Pr(>|z|)=.249). Verb length and frequency effects were not found (see Appendix 6b). Inter-subject variability in the production of true reflexive verbs was below 1 (SD=0.99, as shown in Figure 8), which means that the number of the children's target answers was more evenly distributed. The data provided in Appendix 9b show that only two children produced half of the target true reflexive verbs, one child produced four, whereas in

[13] After all GLMER analyses in the first part of the research were conducted, the percentage of the analyses in which verb length was significant was calculated in relation to the total number of analyses (fifteen).

all the remaining cases the participants gave five or six target answers. Inter-subject variability in the case of lexical reflexive verbs was even lower (SD=0.37), which means that individual differences in the production were small (for more details see Appendix 9b).

No difference in the production of **true and lexical reciprocal verbs** was found, either (β=.014; z=.011; Pr(>|z|)=.991), nor were there any verb length and frequency effects found (see Appendix 6b). Interestingly, as it can be seen in Figure 8, inter-subject variability in the production of true reciprocal verbs was higher in this group (SD=1.05) than in the group of three-year-olds. As it can be seen in Appendix 9b, half of the target answers were produced in 40% of the cases. Five four-year-olds produced four target true reciprocal verbs, five four-year-olds produced five, and two participants even reached maximum production. Inter-subject variability in the case of lexical reciprocal verbs was still higher (SD=1.46). Five participants produced the maximum number of verbs, and three participants produced five target verbs, which is an important difference in comparison with the group of three-year-olds, where no participants produced five or six target verbs. Both four and three target answers were given by five children. One child produced only one, and another produced only two target lexical reciprocal verbs.

The GLMER analyses with three levels of the verb type effect gave significant results. The GLMER analysis comparing the production of **true reflexive, lexical reflexive, and true reciprocal verbs** shows that both lexical reflexive verbs (β=3.046; z=2.076; Pr(>|z|)=.037*) and true reflexive verbs (β=1.802; z=1.646; Pr(>|z|)=.099.) were produced more accurately than true reciprocal verbs, although the difference in the production of true reflexive and true reciprocal verbs was only marginal in the group of four-year-olds (Table 14).

Random effects			*Variance*	*SD*
Subject : Intercept			1.047	1.023
Stimuli : Intercept			2.344	1.531
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	1.586	.842	1.883	.059.
Trial Order	.003	.033	.118	.906
Verb Frequency	.589	.623	.945	.344
Verb Length	-.432	.463	-.934	.350
Verb Type (lexical reflexive)	3.046	1.467	2.076	.037*
Verb Type (true reflexive)	1.802	1.095	1.646	.099.

Table 14 – True reflexive, lexical reflexive, and true reciprocal GLMER analysis on the sample of 4-year-olds

The GLMER analysis comparing the production of **true reflexive, lexical reflexive, and anti-causative verbs** 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 15).

Random effects			*Variance*	*SD*
Subject : Intercept			.734	.856
Stimuli : Intercept			1.091	1.044
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	.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 15 – True reflexive, lexical reflexive and anti-causative GLMER analysis on the sample of 4-year-olds

In comparison with anti-causative verbs produced in the group of three-year-olds, the answers in this group showed less variability (SD=1.25, as shown in Figure 8). As shown in Appendix 9b, the children produced three to five correct answers in 85% of the cases (nine children produced 5 target anti-causative verbs, four children produced 4, and four more produced 3). Two target anti-causative verbs were produced twice, and only one was produced once. There were no children who produced none or all the target verbs.

The last GLMER analysis within the second model was conducted in order to compare the production of **true reciprocal and anti-causative verbs**. No significant difference was found

in the group of four-year-olds (β=1.743; z=1.102; Pr(>|z|)=.270), as was the case with three-year-olds (for more details, see Appendix 6b.). The verb length effect again proved significant (β=-1.566; z=-2.020; Pr(>|z|)=.043*). Yet, for the above-mentioned reasons, this effect is not conclusive.

4.6.1.3. Five-year-olds

The same GLMER analyses were conducted within the third GLMER model. The results of the third GLMER analysis comparing the production of **true and lexical reflexive verbs** show that lexical reflexive verbs were produced significantly better than true reflexive verbs at the age of 5 (β=2.213; z=2.027; Pr(>|z|)=.042*). Verb length and frequency effects were not found. The results of all the GLMER analyses with two levels of the verb type effect in the group of five-year-olds are provided in the form of tables in Appendix 6c. In comparison with the previous two age groups, inter-subject variability in the production of true reflexive verbs was lower (SD=0.69, as shown in Figure 8). The minimum number of target true reflexive verbs produced was four (produced by two participants). In 90% of the cases, the participants produced five or six target verbs (six and twelve children, respectively). Inter-subject variability was even lower in the case of lexical reflexive verbs (SD=0.22). Maximum production was reached by 95% of the children. Five target lexical reflexive verbs were produced by only one subject.

No difference in the production of **true and lexical reciprocal verbs** was found at the age of 5 (β=-.711; z=-.452; Pr(>|z|)=.651), which was the case with all the tested groups. Verb length and frequency effects were not found either. As shown in Figure 8, inter-subject variability in the production of true reciprocal verbs (SD=0.85) was lower than in the group of four-year-olds, but higher than in the youngest group tested, which indicates that children acquire some of the tested true reciprocal verbs at almost the same pace at an earlier stage of

language acquisition, whereas the acquisition of other true reciprocal verbs varies. Five verbs were produced by almost half of the participants (nine), and the maximum number of target verbs was produced by five children. Five children produced four target verbs, and one child produced only three (Appendix 9c). Inter-subject variability in the production of lexical reciprocal verbs was below 1 for the first time (SD=0.98). The children produced four or more target lexical reciprocal verbs in 90% of the cases (six children produced six target answers, seven children produced five target answers, and five children produced four target answers). There were two participants who produced only half of the target answers.

The comparison of the production of **true reflexive, lexical reflexive, and true reciprocal verbs** presented in Table 16 supports the results of the previous two GLMER analyses when it comes to the comparison of lexical reflexive and true reciprocal verbs. Lexical reflexive verbs were produced more successfully than true reciprocal verbs (β= 3.002; z= 1.285; Pr(>|z|)=.019*), although the difference between the production of true reflexive and true reciprocal verbs was not significant at this age (β= .700; z=.828; Pr(>|z|)=.407).

Random effects			*Variance*	*SD*
Subject : Intercept			9.777e-07	.000
Stimuli : Intercept			1.282e+00	1.132
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	2.270	.727	3.121	.001**
Trial Order	-.012	.039	-.322	.747
Verb Frequency	.346	.442	.782	.434
Verb Length	-.117	.323	-.362	.717
Verb Type (true reflexive)	.700	.845	.828	.407
Verb Type (lexical reflexive)	3.002	1.285	2.336	.019*

Table 16 – True reflexive, lexical reflexive, and true reciprocal GLMER analysis on the sample of 5-year-olds

The last GLMER analysis comparing the production of **true reflexive, lexical reflexive, and anti-causative verbs** presented in Table 17 supports the results of the previous two GLMER analyses when it comes to the comparison of lexical reflexive and anti-causative verbs. Lexical reflexive verbs were produced more successfully than 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 (anti-causative)	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 17 – True reflexive, lexical reflexive, and anti-causative GLMER analysis on the sample of 5-year-olds

Inter-subject variability in the production of anti-causative verbs was the lowest in the group of five-year-olds (SD=0.99). The children produced four or more target anti-causative verbs in 85% of the cases (four children produced the maximum number of target verbs, seven children produced 5 target anti-causative verbs, and six children produced 4). The minimum number of target answers produced per child in the oldest tested group was three, produced by three children (Appendix 9c).

In the final GLMER analysis, the difference between the production of **true reciprocal and anti-causative verbs** proved to be significant. Anti-causative verbs were produced less successfully than true reciprocal verbs at the age of five (β=-.505; z=-236.3; Pr(>|z|)=<2e-16***). Both verb length (β=-.145; z=-67.9; Pr(>|z|)=<2e-16***) and frequency effects (β=.282; z=131.8; Pr(>|z|)=<2e-16 ***) were significant as well, but since this was the only analysis in which verb frequency was significant, while verb length was significant in only two other cases in the three age groups, no definite conclusions can be drawn.

4.6.1.4. Interpretation of results

The results of the first experiment indicate that the production of lexical reflexive verbs is most accurate, followed by true reflexive verbs. On the other hand, the production of true

reciprocal, lexical reciprocal, and anti-causative verbs seems to lag behind, which answers the first research question regarding the order of the acquisition of Serbian *se*-verbs. This was expected, due to their greater complexity. The difference between the production of true and lexical reflexive verbs in the youngest and oldest groups tested can be explained by the fact that true reflexive verbs can be replaced with their transitive variants, whereas lexical reflexive verbs cannot. The meanings of transitive variants of lexical reflexive verbs, in those cases in which they are available, are completely different – they cannot be used to mark the process that the subject is undergoing (cf. *ljuljati se* 'swing' versus transitive *ljuljati* 'make someone/something move backward and forward'), as opposed to transitive variants of true reflexive verbs (cf. *češljati se* 'comb oneself' vs. *češljati kosu* 'comb one's hair'). With many lexical reflexive verbs, transitive readings are not available at all – they are completely lexicalised (e.g. *smejati se* 'laugh'). However, the difference between the two verb types was only marginal in the group of three-year-olds, and it was not found in the group of four-year-olds. On the other hand, no significant difference was found between the production of true and lexical reciprocal verbs at any of the tested ages. Overall, the results of the present study indicate that lexicality can be an important factor in the production of reflexive, but not reciprocal verbs (which answers the second research question). The Serbian Electronic Corpus of Children's Early Language (Anđelković–Ševa, & Moskovljević, 2001) can be checked in future studies in order to see when both lexical reflexive and lexical reciprocal verbs appear in comparison with morpho-syntactically derived forms of reflexive and reciprocal verbs.

The results of the first two age groups indicate that children have more difficulty producing true reciprocal and anti-causative verbs than true or lexical reflexive verbs, as the initial hypothesis predicted. In the oldest group tested, the difference between the production of true reflexive and true reciprocal verbs was not significant, whereas the difference between the

production of lexical reflexive and true reciprocal verbs was still significant (as was the case with the production of true reflexive, lexical reflexive and anti-causative verbs at the age of 5). The results thus confirm the results of the analysis of the production of true and lexical reflexive verbs, which showed that the production of lexical reflexive verbs was significantly better than the production of true reflexive verbs at the age of five.

Finally, true reciprocal verbs were produced significantly better than anti-causative verbs in the group of five-year-olds, which was not the case in the younger groups. This result was obtained in the pilot study as well. It could imply that, while both of these types of *se*-verbs are difficult at earlier stages of language acquisition, anti-causative verbs remain difficult for a longer time. Verb frequency proved to be significant only in the production of true reciprocal and anti-causative verbs in the group of five-year-olds, whereas verb length was significant in the production of these two verb types in all the three groups. This could imply that shorter true reciprocal and anti-causative verbs are produced more successfully. However, since verb length effect was not significant in 80% of the analyses, it can be concluded that it is not a stable effect. For a more detailed discussion of the obtained results see Chapter 6.

We proceeded to statistical analyses per verb type in order to determine whether the differences in the production of the five verb types between the three age groups prove significant.

4.6.2. Development of production per verb type

The results of the first GLMER analysis comparing the production of **true reflexive verbs** at the three ages tested are graphically presented in Figure 9. The y-axis shows the total number of correct answers out of 120 observations per age group. The analysis shows that true reflexive verbs were produced more successfully at the age of 4 than at the age of 3. The

difference in the production between the two ages proved to be significant (β=1.056; z=2.672; Pr(>|z|)=.007**), as did the difference in the production between 5-year-olds and 3-year-olds (β=1.182; z=2.914; Pr(>|z|)=.003**). However, the difference in the production was not significant between the ages of 4 and 5 (β=.125; z=.272; Pr(>|z|)=.785), which could imply that true reflexive verbs are fully acquired around the age of four. An effect of verb length was found (β= -.708; z= -2.036; Pr(>|z|)= .041*), whereas there was no effect of verb frequency on the production of true reflexive verbs (β=-.289; z= -1.084; Pr(>|z|)= .278). Complete tables with results of the statistical analyses of the production of separate verb types across the groups are provided in Appendix 6d.

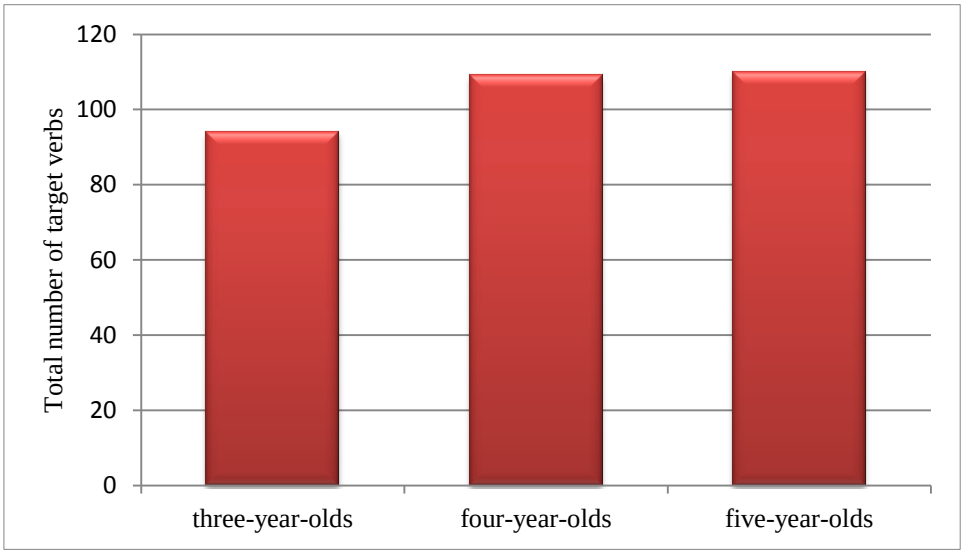


Figure 9 – Differences in true reflexive verb production between groups

Table 18 shows the production of individual true reflexive verbs, given in percentages. What can be seen is that the production of the verb *oblačiti se* 'dress' was the least successful in the group of three-year-olds, whereas the production of the verb *kupati se* 'bathe' was the most successful in all three groups. It was the only verb for which the production reached 100% in each of the tested groups. Even though the statistical analysis showed no effect of the frequency of individual verbs on the production of true reflexive verbs, this might be taken as an indication that the verb *kupati se* 'bathe' is one of the first true reflexive verbs to be

acquired. Alternatively, it could point to its level of lexicalisation, which is the highest among the tested true reflexive verbs.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
oblačiti se 'dress'	55%	90%	95%
umivati se 'wash one's face'	70%	90%	90%
brisati se 'dry oneself'	75%	85%	85%
kupati se 'bathe'	100%	100%	100%
češljati se 'comb oneself'	90%	90%	90%
šminkati se 'put on make-up'	80%	90%	90%

Table 18 – Production of individual true reflexive verbs

The second GLMER analysis comparing the production of **lexical reflexive verbs** across the age groups gave almost the same results, presented in Figure 10. The production of five-year-olds was significantly better than the production of three-year-olds (β=3.294; z=2.945; Pr(>|z|)=.003**), although it was not significantly better than the production of four-year-olds (β=1.219; z=1.015; Pr(>|z|)=.309). Furthermore, the production of lexical reflexive verbs was significantly better at the age of 4 than at the age of 3 (β=2.074; z=2.873; Pr(>|z|)=.004**). Therefore, the results indicate that lexical reflexive verbs are fully acquired around the age of 4 as well. The effect of verb length was only marginal (β=1.384; z= 1.869; Pr(>|z|)=.061.). An effect of frequency on the production of lexical reflexive verbs was not found (β=-.430; z=-.529; Pr(>|z|)=.597).

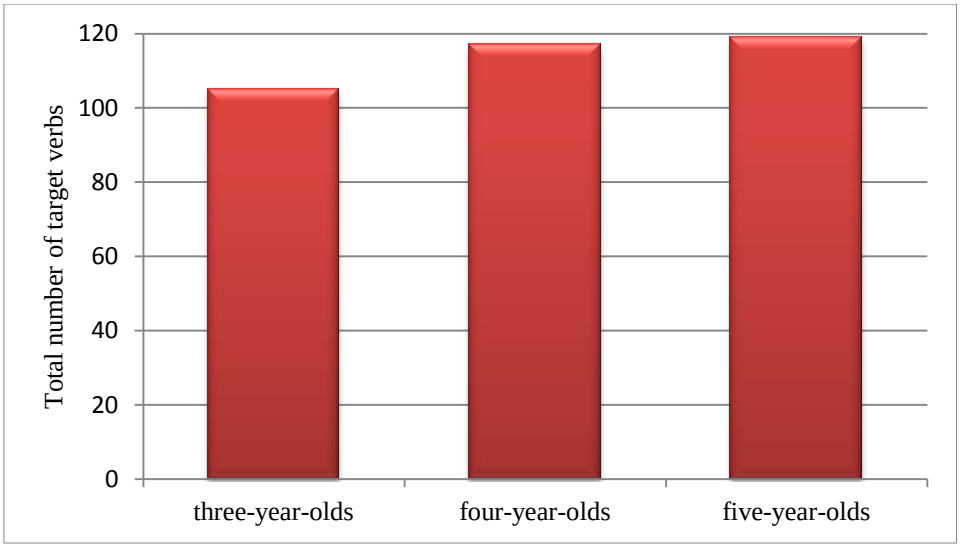


Figure 10 – Differences in lexical reflexive verb production between groups

The production of each verb belonging to the category of lexical reflexive verbs was quite successful, as shown in Table 19. Even in the group of three-year-olds, the production was never lower than 70%. The production reached 100% for the verbs *ljuljati se* 'swing' and *spuštati se* 'slide' in each of the tested groups; it reached 100% for the verbs *igrati se* 'play', *penjati se* 'climb' and *smejati se* 'laugh' in the group of four-year-olds and five-year-olds. The only verb for which the production increased more steadily was the verb *vrteti se* 'spin'.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
igrati se 'play'	85%	100%	100%
penjati se 'climb'	95%	100%	100%
vrteti se 'spin'	75%	85%	95%
smejati se 'laugh'	70%	100%	100%
ljuljati se 'swing'	100%	100%	100%
spuštati se 'slide'	100%	100%	100%

Table 19 – Production of individual lexical reflexive verbs

As opposed to the results obtained for true and lexical reflexive verbs, the next GLMER analysis showed that there was a significant difference in the production of **true reciprocal**

verbs between all the ages tested. As Figure 11 shows, the production of true reciprocal verbs was most successful at the age of 5. True reciprocal verbs were produced more accurately at the age of 5 than at the age of 3 (β=2.777; z=6.456; Pr(>|z|)=.000***), or at the age of 4 (β=1.101; z=2.958; Pr(>|z|)=.003**). Moreover, true reciprocal verbs were produced more accurately at the age of four than at the age of three (β=1.676; z=4.349; Pr(>|z|)=.000***). The results imply that the developmental pattern of true reciprocal verbs takes a longer time than that of true and lexical reflexive verbs. Importantly, both an effect of frequency (β=1.539; z=2.434; Pr(>|z|)=.014*) and an effect of verb length (β=-1.872; z=-2.912; Pr(>|z|)=.003**) were found with this type of *se*-verbs.

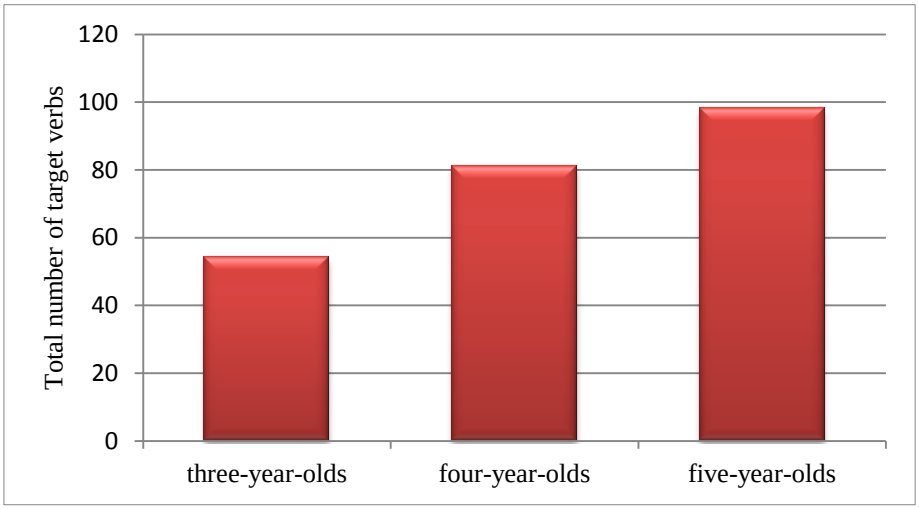


Figure 11 – Differences in true reciprocal verb production across groups

The success in producing individual true reciprocal verbs presented in Table 20 shows much greater variability in comparison with all other verb types. Whereas the verbs *grliti se* 'hug each other', *ljubiti se* 'kiss each other', and *tući se* 'fight with each other' were produced quite successfully even in the group of three-year-olds, the verbs *juriti se* 'chase each other', *gađati se* 'throw something at each other' and *gledati se* 'look at each other' were difficult for children to produce. Only the production of the verb *gađati se* 'throw something at each other' reached 90% in the group of five-year-olds. What needs to be pointed out though is that the children's responses for the first two verbs often included morpho-syntactic errors,

when the child would use the third person singular instead of the third person plural form of the target verb (e.g. (*za)grli se* instead of *(za)grle se*). This was noted 6 times in the case of the verb *grliti se* 'hug each other' and 5 times in the case of the verb *ljubiti se* 'kiss each other' in the group of three-year-olds. For the verb *udarati se/tući se* 'hit each other' it was noted once in the group of three-year-olds and twice in the group of four-year-olds. Since other morphosyntactic errors were neglected in coding (such as *zagrliju se* instead of the correct 3rd person plural perfective present form *zagrle se*), all of these answers were coded as target. Similar mistakes were noted in some non-target answers as well.

The statistical analysis has shown that the effect of frequency of individual verbs was significant. Interestingly, although the verb *gledati se* 'look at each other' has the highest frequency in srWaC, its production was only 5% in the group of three-year-olds, and it reached only 65% in the oldest group tested. The reason for this might be its more challenging perceptual-cognitive mapping in comparison with action verbs such as *grliti se* 'hug each other'. On the other hand, the verb *juriti se* 'chase each other', which is the verb with the lowest frequency in srWaC, indeed proved to be the most difficult one to produce. We expected this verb to be much easier, since this is a common activity for children. The reasons for such poor performance will be further discussed in Section 4.6.3.3.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
grliti se 'hug each other'	90%	100%	95%
ljubiti se 'kiss each other'	80%	70%	100%
tući se 'fight with each other'	80%	100%	100%
juriti se 'chase each other'	10%	30%	40%
gađati se 'throw something at each other'	5%	40%	90%
gledati se 'look at each other'	5%	65%	65%

Table 20 – Production of individual true reciprocal verbs

The fourth GLMER analysis gave almost the same results for the production of **lexical reciprocal verbs** as the one for true reciprocal verbs. As it can be seen in Figure 12, there was a sharp increase in the production of lexical reciprocal verbs at the age of four. Four-year-olds produced lexical reciprocal verbs significantly better than three-year-olds (β=2.406; z=6.950; Pr(>|z|)=.000***), as was the case with five-year-olds in comparison with three-year-olds (β=3.043; z=7.743; Pr(>|z|)=.000***). However, the difference in the production between five-year-olds and four-year-olds was only marginal (β=.637; z=1.860; Pr(>|z|)=.062.). As was the case with true reciprocal verbs, both the effect of frequency (β=.702; z=2.091; Pr(>|z|)=.036*) and the effect of verb length (β=.746; z=2.317; Pr(>|z|)=.020*) were found with lexical reciprocal verbs.

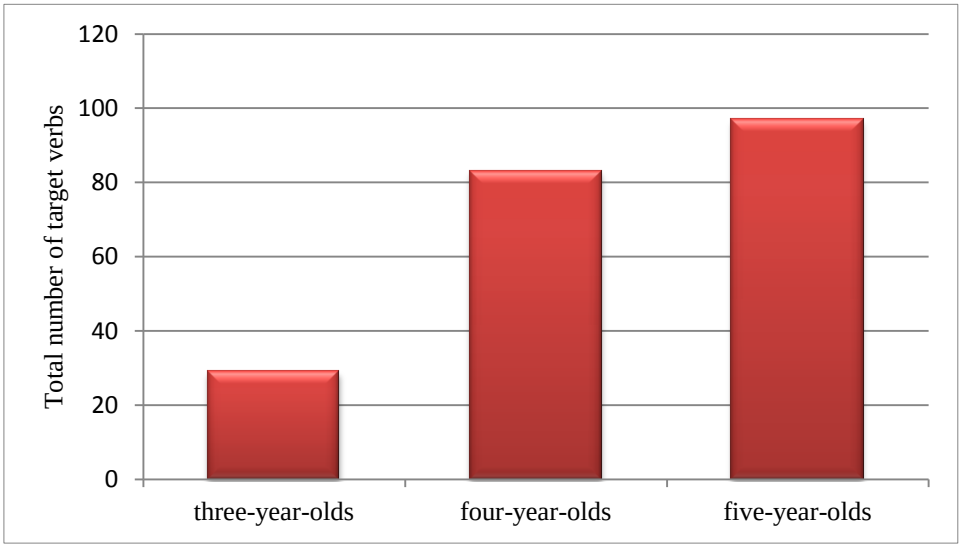


Figure 12 – Differences in lexical reciprocal verb production across groups

The production of individual lexical reciprocal verbs shown in Table 21 was more evenly distributed. In the group of three-year-olds, the production did not exceed 40%, which was reached for the verbs *dobacivati se* 'throw a ball at each other' and *sudariti se* 'collide'. The percentages in the other two groups did not differ significantly. The production of the verb *rukovati se* 'shake hands', which has a relatively low frequency in srWaC, remained the

lowest, whereas the production of the most frequent verb in srWaC, the verb *mačevati se/boriti se* 'fence/fight' reached the maximum production in the oldest group.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
svađati se 'argue'	20%	85%	85%
trkati se 'race'	5%	50%	75%
mačevati se/boriti se 'fence/fight'	30%	90%	100%
rukovati se 'shake hands'	10%	40%	55%
dobacivati se 'throw a ball at each other'	40%	65%	80%
sudariti se 'collide'	40%	85%	90%

Table 21 – Production of individual lexical reciprocal verbs

The last GLMER analysis comparing the production of **anti-causative verbs** across the age groups replicated the findings for true and lexical reciprocal verbs. Five-year-olds produced anti-causative verbs significantly better than both four-year-olds (β=.657; z=2.106; Pr(>|z|)=.035*) and three-year-olds (β=1.814; z=5.676; Pr(>|z|)=.000***). Moreover, anti-causative verbs were produced more accurately at the age of four than at the age of three (β=1.156; z=3.909; Pr(>|z|)=.000***). The only difference in comparison with true and lexical reciprocal verbs was that neither a frequency effect (β=-.113; z=-.298; Pr(>|z|)=.766), nor an effect of verb length (β=.102; z=.272; Pr(>|z|)=.786) was found. The results are presented in Figure 13.

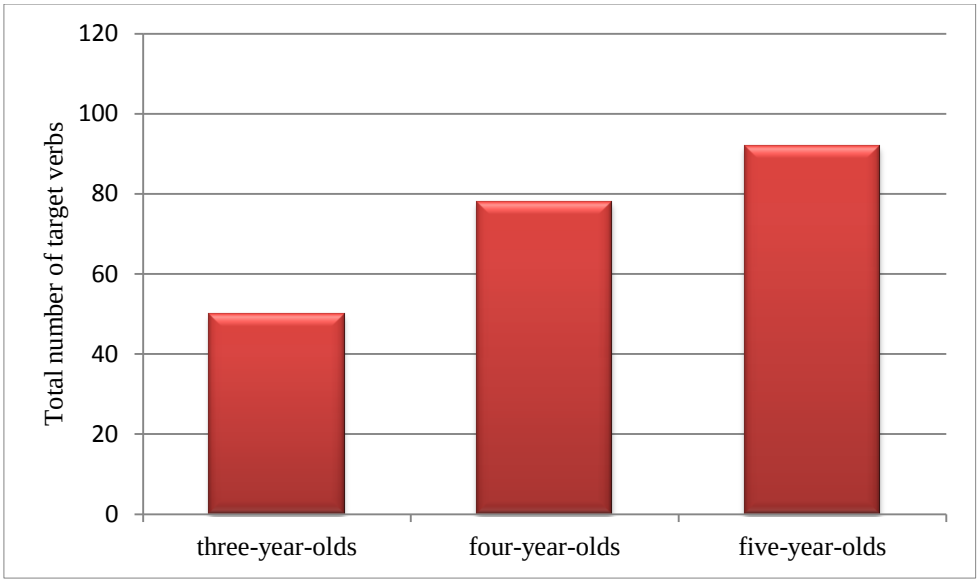


Figure 13 – Differences in anti-causative verb production across groups

Table 22 shows the production of individual anti-causative verbs. The production of all anti-causative verbs in the group of three-year-olds ranged between 30% and 45%, except for the verb *pokvariti se* 'stop working', which could indicate that this verb is the most lexicalised one. In the group of four-year-olds, the production of the verbs *upaliti se* 'turn on' and *ugasiti se* 'go out' did not improve, whereas the production of all other verbs was 70% or above. The results of the group of five-year-olds show that *ugasiti se* 'go out' remained the most difficult verb to produce.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
otvoriti se 'open',	45%	80%	95%
zatvoriti se 'close'	40%	70%	65%
upaliti se 'turn on'	30%	30%	80%
ugasiti se 'go out'	30%	35%	40%
pokvariti se 'stop working'	60%	95%	95%
polomiti se 'break'	45%	80%	85%

Table 22 – Production of individual anti-causative verbs

Thus, the results indicate that true reflexive and lexical reflexive verbs are acquired before true reciprocal, lexical reciprocal, and anti-causative verbs. It is important to note that an effect of verb length was found with all the verb types except with anti-causatives (and it was only marginal in the case of lexical reflexive verbs), whereas a frequency effect was found only with true and lexical reciprocal verbs. The effect of verb length suggests that shorter verbs are produced with more success, whereas the frequency effect suggests that more frequent verbs are produced more successfully. Frequency does not seem to play an important role in the production of true and lexical reflexive verbs, or in the production of anti-causative verbs, but it seems to have an influence on the production of true and lexical reciprocal verbs.

4.6.3. Non-target answers

4.6.3.1. True-reflexive verbs

When it comes to non-target answers for true reflexive verbs, there were 26 non-target answers in the group of three-year-olds, 11 non-target answers in the group of four-year-olds, and 10 non-target answers in the group of five-year-olds, as presented in Table 23. Non-target answers in all the three groups most often included transitive variants of verbs instead of the variants with the clitic *se* (e.g. *briše lice* 'she is drying her face' instead of *briše se* 'she is drying herself'). The number of answers belonging to this category was the highest in the group of three-year-olds (12/26), totalling 10% of the total number of children's answers for true reflexive verbs (12/120). Moreover, the children who produced non-target verbs (3/26) in the youngest group chose constructions with complements (*ona briše svoje lice sa ovim* 'she is drying her face with this'), or even adverbs (*ovako trljaš* 'you rub (it) 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 the group of four-year-olds 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), representing 8% of the total number of 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 the group of five-year-olds were very similar to those in the group of four-year-olds. 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, which is why they could not be coded as ‘target’. All the answers are given in Appendix 7a.

The number of non-target answers with complements points to some children’s preference towards transitive variants of verbs. It also explains the somewhat lower production of true reflexive verbs in comparison with lexical reflexive verbs.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	3 *ona briše svoje lice sa ovim* she.nom dry.3sg.pres her face.acc with this.inst 'she is drying her face with this' instead of *šminka se* 'she is putting on make-up'	1 *trlja* rub.3sg.pres 'he is rubbing' instead of *umiva se* 'he is washing his face'	2 *pere se* wash.3sg.pres SE 'he is washing himself' instead of *umiva se* 'he is washing his face'	6
Transitive verbs Example	12 *kosu četka* hair.acc brush.3sg.pres 'she is brushing her hair' instead of *češlja se* 'she is combing herself'	9 *oblači majicu* put on.3sg.pres T-shirt.acc 'he is putting on a T-shirt' instead of *oblači se* 'he is dressing'	8 *šminka usta* put on make-up.3sg.pres lips.acc 'she is putting on lipstick' instead of *šminka se* 'she is putting on make-up'	29
Target verbs without the clitic *se* Example	2 *maže* put on.3sg.pres 'she is putting on' instead of *šminka se* 'she is putting on make-up'	/	/	2
Made-up verbs	/	/	/	0
Nouns Example	1 *tu majicu* that T-shirt.acc 'that T-shirt' instead of *oblači se* 'he is dressing'	/	/	1
Other Example	1 *on se ovako* he.nom SE like this 'he himself like this' instead of *umiva se* 'he is washing his face'	/	/	1
No answer	7	1	/	8
Total number of non-target answers:	26	11	10	47

Table 23 – Non-target answers for true reflexive verbs across groups

4.6.3.2. Lexical reflexive verbs

As it can be seen in Table 24, the number of non-target answers for lexical reflexive verbs was lower 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 the group of three-year-olds, 3 non-target answers in the group of four-year-olds and only 1 non-target answer in the group of five-year-olds. There were only four categories of non-target answers observed: 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 the group of three-year-olds, two in the group of four-year-olds, and only one non-target verb in the group of five-year-olds. What can be seen from the children's non-target 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 *penje se* 'he is climbing'), most likely due to their very young age. There were only two instances of verbs used without the clitic *se* in the group of three-year-olds and one in the group of four-year-olds. 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 produced no answer on four occasions, all in the youngest group tested. All the answers are provided in Appendix 7b.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	6 *ne plače* not cry.3sg.pres 'he is not crying' instead of *smeje se* 'he is laughing'	2 *igra balet* dance.3sg.pres ballet.acc 'she is dancing ballet' instead of *vrti se* 'she is spinning'	1 *pleše* dance.3sg.pres 'she is dancing' instead of *vrti se* 'she is spinning'	9
Transitive verbs	/	/	/	0
Target verbs without the clitic *se* Example	2 *igra* play.3sg.pres (2x) transitive 'play' instead of *igra se* 'she is playing'	1 *vrti* spin.3sg.pres transitive 'spin' instead of *vrti se* 'she is spinning'	/	3
Made-up verbs	/	/	/	0
Nouns	/	/	/	0
Other Example	3 *srećan je* happy.adj.masc is 'he is happy' instead of *smeje se* 'he is laughing' (2x)	/	/	3
No answer	4	/	/	4
Total number of non-target answers:	15	3	1	19

Table 24 – Non-target answers for lexical reflexive verbs across groups

4.6.3.3. True reciprocal verbs

As far as non-target answers for true reciprocal verbs are concerned, their number was much higher than the number of non-target answers for true and lexical reflexive verbs (66 in the group of three-year-olds, 39 in the group of four-year-olds, and 22 in the group of five-year-olds). More than 70% of the non-target answers in all the three groups belonged to the category of non-target verbs (91/127). Non-target verbs formed almost 40% of the total number of answers given for true reciprocal verbs in the group of three-year-olds (47/120); their number was almost twice as low in the group of four-year-olds (28/120), and it was reduced to 13% of the total number of targeted reciprocal answers in the oldest group tested (16/120).

As far as other non-target answers are concerned, their number was much lower. Using transitive verbs instead of reciprocal verbs was not nearly as frequent as with true reflexive verbs. It is important to mention that three transitive variants with the complement *jedan drugog* 'each other' used instead of the clitic *se* were only produced in the group of five-year-olds (e.g. *grle jedan drugog* instead of *grle se* 'they are hugging each other'). In the two younger groups, the sentences included a single Agent and Patient (e.g. *dečak je ljubio devojčicu* 'the boy was kissing the girl'). The clitic *se* was omitted nine times, most frequently with the verb *ljube se* 'they are kissing'. There was only one made-up verb, one noun used instead of the target verb, and two answers categorised as 'other', all produced in the group of three-year-olds. The made-up verb that was produced exists in Serbian, but with a different valency (e.g. *oni se pričaju* 'they are talking', which cannot be used with the clitic *se*). The answers categorised as 'other' included the adverb *ovako* 'like this' and an imitation of the presented activity. The children did not give any answer eight times in the group of three-year-olds, five times in the group of four-year-olds, and twice in the group of five-year-

olds. Non-target answers provided instead of the target true reciprocal verbs are presented in Table 25.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	47 *volu*[14] *se* love.3pl.pres SE 'they love each other' instead of *grle se* 'they are hugging each other'	28 *bacaju jastuke* throw.3pl.pres pillows.acc 'they are throwing pillows' instead of *gađaju se* 'they are throwing something at each other'	16 *igraju se šuge/vije/jurke* play.3pl.pres SE chasing/tag.gen 'they are playing chasing/tag' instead of *jure se* 'they are chasing each other'	91
Transitive verbs Example	4 *dečak je ljubio devojčicu* boy.nom kiss.3sg.past girl.acc 'the boy was kissing the girl' instead of *ljube se* 'they are kissing each other'	1 *brat gleda u seku* brother.nom look.3sg.pres at sister.acc *a seka gleda u brata* and sister.nom look.3sg.pres at brother.acc 'the brother is looking at his sister and the sister is looking at her brother' instead of *gledaju se* 'they are looking at each other'	3 *grle jedan drugog* hug.3pl.pres each other 'they are hugging each other' instead of *grle se* 'they are hugging each other'	8
Target verbs without the clitic *se* Example	3 *tuče* fight.3sg.pres 'he is beating' instead of *tuku se* 'they are fighting with each other'	5 *ljube* kiss.3pl.pres 'they are kissing' instead of *ljube se* 'they are kissing each other'	1 *vijaju* chase.3pl.pres 'they are chasing' instead of *jure se* 'they are chasing each other'	9
Made-up verbs Example	1 *oni se pričaju* they.nom SE talk.3pl.pres 'they are talking' instead of *gledaju se* 'they're looking at each other'	/	/	1
Nouns Example	1 *juranje*[15]	/	/	1

[14] This verb form is substandard. The standard form is *vole*.

	‘chasing’ instead of *jure se* ‘they are chasing each other’			
Other Example	2 *ovako* ‘like this’ instead of *tuku se* ‘they are fighting with each other’	/	/	2
No answer	8	5	2	15
Total number of non target answers:	66	39	22	127

Table 25 – Non-target answers for true reciprocal verbs across groups

[15] This noun form is incorrect. The correct form is *jurenje*.

Since the answers belonging to the non-target verb category were by far the most numerous, they were further analysed. As it can be seen in Table 26, the syntactic complexity of non-target verbs varied. In half of the cases, the participants would replace the target true reciprocal verb with the 3rd person plural form of an unergative or a transitive verb, which are syntactically the least complex verb types. The unergative verb *trče* 'they are running' was often used instead of the target *jure se* 'they are chasing each other'. The most frequent non-target answer for the target verb *gađaju se* 'they are throwing (pillows) at each other' was the transitive verb *bacaju (jastuke)* 'they are throwing (pillows)'. Therefore, the children would choose an unergative or a transitive verb, with co-Agents instead of simultaneous Agents and Patients. Moreover, one third of the answers that were used instead of the target true reciprocal verbs were lexical reflexive verbs. The most frequent lexical reflexive verb was the verb *igraju se* 'they are playing', which was frequently used as a response for the target *gađaju se* 'they are throwing something at each other' and *jure se* 'they are chasing each other'. Two unaccusative verbs (*sede* 'they are sitting' and *stoje* 'they are standing') were used as well, as a response to the stimulus testing the verb *gledaju se* 'they are looking at each other'. Non-target answers for this verb included verbs denoting different states or activities of the boy and the girl presented in the stimulus, such as the transitive verb *pričaju* 'they are talking'.

However, the participants did not produce only syntactically simpler answers. Seven instances of different true reciprocal verbs were noted in the group of three-year-olds, and three more in the group of four-year-olds. They could not be coded as 'target' due a difference in meaning, as was the case with the verb *volu*[16] *se* 'they love each other', which was used instead of *grle se* 'they are hugging each other' or *udaraju se jastucima* 'they are hitting each other with pillows' instead of *gađaju se* 'they are throwing something at each

[16] Substandard verb form (see footnote 6).

other'. Interestingly, two lexical reciprocal verbs were used in the youngest group, one in the middle group, and one more in the oldest group tested (e.g. *druže se* 'they are hanging out' instead of *gledaju se* 'they are looking at each other'). See Appendix 7c for more details.

Verb type	Three-year-olds	Four-year-olds	Five-year-olds	Total (out of 91)
Unergative and transitive	23	14	6	43
Lexical reflexive and unaccusative	15	10	9	34
True reciprocal	7	3	/	10
Lexical reciprocal	2	1	1	4

Table 26 – Syntactic complexity of non-target verbs used instead of true reciprocal verbs

4.6.3.4. Lexical reciprocal verbs

The number of non-target answers for lexical reciprocal verbs was higher than the number of non-target answers for true reciprocal verbs in the youngest group, but it was very similar to their number in the remaining two groups (91 non-target answers in the group of three-year-olds, 37 in the group of four-year-olds, and 23 in the group of five-year-olds). As it can be seen in Table 27, the number of answers belonging to the category of non-target verbs was again the highest, amounting to approximately 80% of the total number of non-target answers (123/151). Non-target verbs constituted almost 60% of the total number of answers for lexical reciprocal verbs in the group of three-year-olds (71/120); their number was less than half as many in the group of four-year-olds (31/120), and it was reduced to 18% of the total number of answers in the oldest tested group (21/120). The clitic was omitted only twice, once in the youngest and once in the oldest group. There were four made-up verbs (two in the group of three-year-olds and one each in the other two groups). All the made-up verbs exist in Serbian, but with a different valency. For instance, the verb *majaju se* was used as a reciprocal verb instead of the lexical reciprocal verb *mačuju se* 'they are fencing', even though the meaning of this lexical reflexive verb is 'to waste time; walk without a purpose', as defined in *Rečnik*

srpskoga jezika [the Dictionary of the Serbian Language] (2011: 654). The frequency of this verb is very low. Hence, the child who used it is probably not familiar with its meaning at all, which further suggests that this form was made-up. The verb *zamahivati* 'swing', produced in the oldest group, was used as if it were a reciprocal verb, instead of the target *rukuju se* 'they are shaking hands'. The incorrect reciprocal use of the verb *bacati* 'throw' was noted again. This time one of the participants from the group of four-year-olds used it instead of the verb *dobacivati se* 'throw a ball at each other'. Two nouns each were produced by three-year-olds and four-year-olds. There were five answers categorised as 'other' in the youngest group and one more in the group of four-year-olds. These answers often included adverbs accompanied by an imitation of the activity presented in the stimulus. The children did not give any answer ten times in the youngest group, but this number was reduced to two in the group of four-year-olds, and there were no responses missing in the group of five-year-olds. All the non-target answers are given in Appendix 7d.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	71 *oni se ovako ljute štapom* they.nom SE like this.adv angry.3pl.pres stick.inst 'they are angry with a stick like this' instead of *mačuju se/bore se* 'they are fencing/fighting'	31 *daju ruku* give.3pl.pres hand.acc 'they are giving their hand' instead of *rukuju se* 'they are shaking hands'	21 *baca jedan-jedan jedan-jedan* throw.3sg.pres one-one one-one 'he is throwing one-one one-one' instead of *dobacuju se* 'they are throwing a ball at each other'	123
Transitive verbs	/	/	/	0
Target verbs without the clitic *se* Example	1 *sudarili* collided.pl.masc instead of *sudarili su se* 'they collided'	/	1 *dobacivaju*[17] throw a ball at each other.3pl.pres instead of *dobacuju se* 'they are throwing a ball at each other'	2
Made-up verbs Example	2 *majaju se* instead of *mačuju se/bore se* 'they are fencing/fighting'	1 *bacaju se* throw.3pl.pres SE 'they are throwing themselves' instead of *dobacuju se* 'they are throwing a ball at each other'	1 *zamahuju se* swing.3pl.pres SE 'they are swinging' instead of *rukuju se* 'they are shaking hands'	4
Nouns Example	2 *dobar dan* 'good day' instead of *rukovati se* 'shake hands'	2 *sudar* 'crash' instead of *collide* 'sudariti se'	/	4
Other Example	5 *ovako* 'like this' instead of *svađati se* 'argue'	1 *ljuti su* angry.pl.masc are 'they are angry' instead of *svađati se* 'argue'	/	6
No answer	10	2	/	12
Total number of non target answers:	91	37	23	151

Table 27 – Non-target answers for lexical reciprocal verbs across groups

[17] This verb form is incorrect. The correct 3rd person plural present verb form would be *dobacuju*.

Since the answers belonging to other categories occurred rather infrequently in the data, we only conducted a more detailed qualitative analysis of the most frequent types of non-target verbs. The results are given in Table 28. Lexical reciprocal verbs were most frequently replaced with unergative or transitive verbs. The most common answer for the target verb *svađaju se* 'they are arguing' was the unergative verb *viču* 'they are yelling'. The verb that the children produced instead of the target *trkaju se* 'they are racing' was in most of the cases the unergative verb *trče* 'they are running'. Interestingly, two of the participants from the youngest group produced the verb *vijaju* 'they are chasing' without the clitic *se*. The non-target answers for the target verb *rukuju se* 'they are shaking hands' included the transitive *daju ruku* 'they are giving their hand', as well as unergative verbs such as *tapšu* 'they are clapping' or *mašu* 'they are waving'. Almost all non-target verbs that were produced instead of the target *dobacuju se* 'they are throwing a ball at each other' were transitive verbs, such as *bacaju loptu* 'they are throwing a ball' or *igraju *loptu* 'they are playing ball'. A very interesting answer was given by a four-year-old who tried to describe the presented reciprocal activity as *baca jedan-jedan jedan-jedan* 'he is throwing one-one one-one' while he was pointing to the girls presented in the picture, who were throwing the ball at each other. Another example worth mentioning was *bacaju sebi loptu* 'they are throwing the ball at themselves'.

Apart from transitive and unergative verbs, true reciprocal verbs were used instead of the target lexical ones. The most frequent non-target verb used instead of the target verb *mačuju se* 'they are fencing' was the true reciprocal verb *tuku se/udaraju se* 'they are fighting/hitting each other'. Likewise, the most frequent verb used instead of the target *rukuju se* 'they are shaking hands' was the true reciprocal verb *pozdravljaju se* 'they are saying hello to each other'. The verb *udarili se* 'they hit each other' reappeared as the answer for the target *sudarili su se* 'they collided'. It is important to mention that two lexical reciprocal verbs were

given as answers for the target *rukuju se* ‘they are shaking hands’, namely *dogovaraju se* ‘they are making a deal’ and *žele da se pomire* ‘they want to make up’.

Other non-target verbs included lexical reflexive verbs, such as *ljute se* ‘they are angry’ for the target *svađaju se* ‘they are arguing’, and for the target *mačuju se* ‘they are fencing’ in one case. The verb *igraju se* ‘they are playing’ was produced as a response to the stimuli used to elicit the verbs *mačuju se* ‘they are fencing’, *rukuju se* ‘they are shaking hands’, and *dobacuju se* ‘they are throwing a ball at each other’.

Verb type	Three-year-olds	Four-year-olds	Five-year-olds	Total (out of 123)
Unergative and transitive	45	21	10	76
True reciprocal	14	7	8	29
Lexical reflexive and unaccusative	12	2	2	16
Lexical reciprocal	/	1	1	2

Table 28 – Syntactic complexity of non-target verbs used instead of lexical reciprocal verbs

4.6.3.5. Anti-causative verbs

As can be seen in Table 29, there were 70 non-target answers used instead of the target anti-causative verbs in the group of three-year-olds, 42 non-target answers in the group of four-year-olds, and 28 non-target answers in the group of five-year-olds, which makes a total of 140 non-target answers for this class of verbs. Different answers were present in all the seven categories (non-target verbs, transitive variants of *se*-verbs, verbs without the clitic *se*, made-up verbs, nouns, other, and no answer), but the answers belonging to the category of non-target verbs were the most numerous again (77/140).

Non-target verbs were most numerous in the group of three-year-olds, and they represent 34% of all the children’s answers targeting anti-causative verbs (41/120). The answers in the category other, in which the participants answered with copular constructions or only adjectives, thus referring to a state rather than a result (e.g. *pokvareno je oko* ‘the eye is

broken' instead of *pokvario se* 'the robot stopped working'), were numerous as well (11/71), representing 9% of the total number of expected responses for anti-causative verbs (11/120). Non-target answers belonging to other categories were not so numerous: there were 6 transitive variants of the target verbs, 4 verbs used without the clitic *se*, 2 made-up verbs, 2 nouns, and 4 times there was no answer.

The number of non-target answers slowly decreased across groups. In the group of four-year-olds, there were 20 non-target verbs (17% of all the answers for anti-causative verbs), 15 answers categorized as other (13% of all the answers for anti-causative verbs), 3 made-up verbs, and one example of 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 verb roots and prefixes they know in the constructions they have not heard before (*se ispalila* 'got burnt out' instead of *ugasila se* 'the candle went out'). The child added the prefix *iz-* 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 the oldest group tested, there were 16 non-target verbs (13% 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, one verb used without the clitic *se* and one made-up verb. The made-up verb produced in this group was the verb *oduvala se* 'it blew out SE'. The transitive verb *oduvati* 'blow out' cannot be turned into an anti-causative verb, because it requires the presence of an Agent. This same verb was used once in the youngest, and twice in the middle group as well. All the answers are given in Appendix 7e.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	41 *deca su izašla i bilo je lupanje* children.nom go-out.3pl.past and was banging.nom 'the children went out and there was banging' instead of *zatvorila su se* 'it closed'	20 *vaza se pokvarila* vase.nom SE stop working.3sg.fem 'the vase stopped working' instead of *polomila se* 'it broke'	16 *poludi* go crazy.3sg.pres 'he goes crazy' instead of *pokvario se* 'it stopped working'	77
Transitive verbs Example	6 *polomili su dečaci* break.3pl.past boys.nom 'the boys broke' instead of *polomila se* 'it broke'	1 *to je otvorio auto kapiju* that open.3sg.past car.nom gate.acc 'the car opened the gate' instead of *otvorila se* 'it opened'	1 *onda su bili zaključani* then lock.3pl.past.pass 'then they were locked' instead of *zatvorila su se* 'it closed'	8
Target verbs without the clitic Example	4 *upalilo* turn on.sg.neut instead of *upalilo se* 'it turned on'	1 *palo i razbilo* fall.sg.neut and break.sg.neut instead of *polomila se* 'it broke'	1 *otvarala* open.sg.fem instead of *otvorila se* 'it opened'	6
Made-up verbs Example	2 *plujava* instead of *polomila se* 'it broke'	3 *ispalila se* instead of *ugasila se* 'it went out'	1 *oduvala se* blow out.3sg.pres SE 'it blew out' instead of *ugasila se* 'it went out'	6
Nouns Example	2 *sunce* 'sun' instead of *upalilo se* 'it turned on'	1 *jutro* 'morning' instead of *upalilo se* 'it turned on'	/	3
Other Example	11 *otvorena* open.fem.adj 'opened' instead of *otvorila se* 'it opened'	15 *je izduvana* is blown.fem.adj 'is blown' instead of *ugasila se* 'it went out'	9 **se polomljena* SE broken.fem.adj 'se broken' instead of *polomila se* 'it broke'	35
No answer	4	1	/	5
Total number of non target answers:	70	42	28	140

Table 29 – Non-target answers for anti-causative verbs across groups

Non-target verbs were further analysed. In the group of three-year-olds, non-target verbs were produced for every tested verb. Almost 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 *zatvorila su se* 'it 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'). Around 30% 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* 'stop working', we can see that children are also prone to giving inanimate objects human-like qualities (*pao i udario se* 'he fell and hit himself' instead of 'the robot stopped working') and that might have prevented them from giving the target answer in some cases. In around 30% of non-target verbs in the youngest group tested, 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'). What needs to be pointed out is that some children used the verb *izduvati* 'deflate' as an anti-causative, which was impossible in the given context. As it can be seen in Table 30, the number of non-target agentive and anti-causative verbs decreased in the groups of four-year-olds and five-year-olds, whereas the number of unaccusative verbs that were used instead of target anti-causative ones remained high.

Verb type	Three-year-olds	Four-year-olds	Five-year-olds	Total (out of 81)
Verbs with Agents	16	4	3	23
Unaccusative verbs	13	13	11	37
Anti-causative verbs[18]	12	3	2	17

Table 30 – Syntactic complexity of non-target verbs used instead of anti-causative verbs

The syntactic variety of non-target answers suggests 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 the group of three-year-olds, which decreased with age. They also seem to make mistakes with placing verbs into fixed or alternating transitivity categories, which was noticed with the verb *oduvati* 'blow out'.

[18] The clitic *se* was omitted in two cases in the group of three-year-olds and twice more in the group of four-year-olds.

5. FOLLOW-UP EXPERIMENT

The purpose of the follow-up experiment was to examine the production of *se*-verbs of the same participants at a later stage of language acquisition. A longitudinal experiment enabled us to compare the production of the tested groups at two points in time, thus detecting the children's language development of the constructions of interest. At the same time, it allowed us to see if the developmental pattern found in the first experiment would be kept.

5.1. Participants and Procedure

After a nine-month period, the same participants were tested. Out of 60 participants, only one participant could not be tested again. A girl from the youngest tested group transferred to a different kindergarten and could not be reached, so another participant of the same age (born in the same month) was tested instead, so as to maintain the same number of children in each group. All the remaining participants were present and ready to cooperate again, many of them not remembering that they had done something similar before, or even the interviewer in some cases. For the sake of clarity and comparability with the results of the first experiment, the children will again be referred to as three-year-olds, four-year-olds, and five-year-olds, although their mean ages almost reached the age of four (M=46.75, SD=2.88), five (M=59.65, SD=2.99), and six (M=70.55, SD=4.19) at the time of the follow-up experiment. The children were tested in December 2019, in "Maslačak" kindergarten, "Radosno detinjstvo" preschool facility in Novi Sad. The procedure was exactly the same as the one in the first experiment, outlined in Section 4.4. The only difference was that the sessions lasted a few minutes shorter on average, because the children responded to the stimuli more quickly.

5.2. Results

5.2.1. Verb production per age group

In the youngest group tested, the production of true reflexive verbs reached almost 90% (N=107, M=5.35, SD=0.81), while the production of lexical reflexive verbs was over 95% (N=116, M=5.8, SD=0.41). In comparison to the results from the same group nine months earlier, presented in Figure 14, there were 13 more true reflexive verbs produced, and 11 more lexical reflexive verbs produced. The improvement was even more prominent in the case of the verbs that proved to be more difficult for children in the first experiment. Nineteen more true reciprocal verbs, thirty more lexical reciprocal verbs and thirty-seven more anti-causative verbs were produced. The production of true reciprocal verbs was around 60% (N=73, M=3.65, SD=0.93), and the production of anti-causative verbs, somewhat unexpectedly, was over 70% (N=87, M=4.35, SD=1.22). After a nine-month period, the production of lexical reciprocal verbs was still the lowest out of all the tested verb types (N=59, M=2.95, SD=1.79), even though it doubled over the 9-month period between the first and the follow-up experiment.

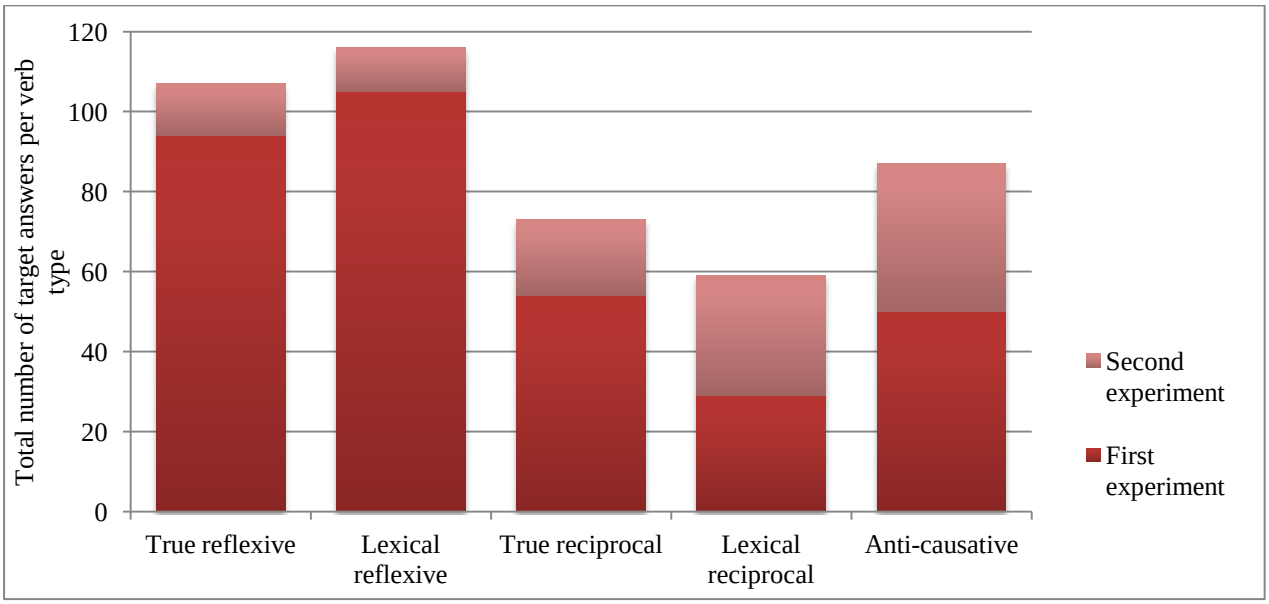


Figure 14 – Increase in the verb production of three-year-olds after a nine-month period

As Figure 15 shows, after a nine-month period, the production of three-year-olds was similar to the production of four-year-olds in the first experiment. Lexical reciprocal verbs were the only verb type for which the production was much lower than that of four-year-olds nine months earlier (there were 24 fewer verbs produced). In all other cases, the difference in the production was below 10 verbs: 2 true reflexive verbs more, 1 lexical reflexive verb more, and 8 true reciprocal verbs more had been produced by the group of four-year-olds nine months earlier. Interestingly, 9 more anti-causative verbs were produced in the group of three-year-olds after a nine-month period than in the group of four-year-olds in the first experiment.

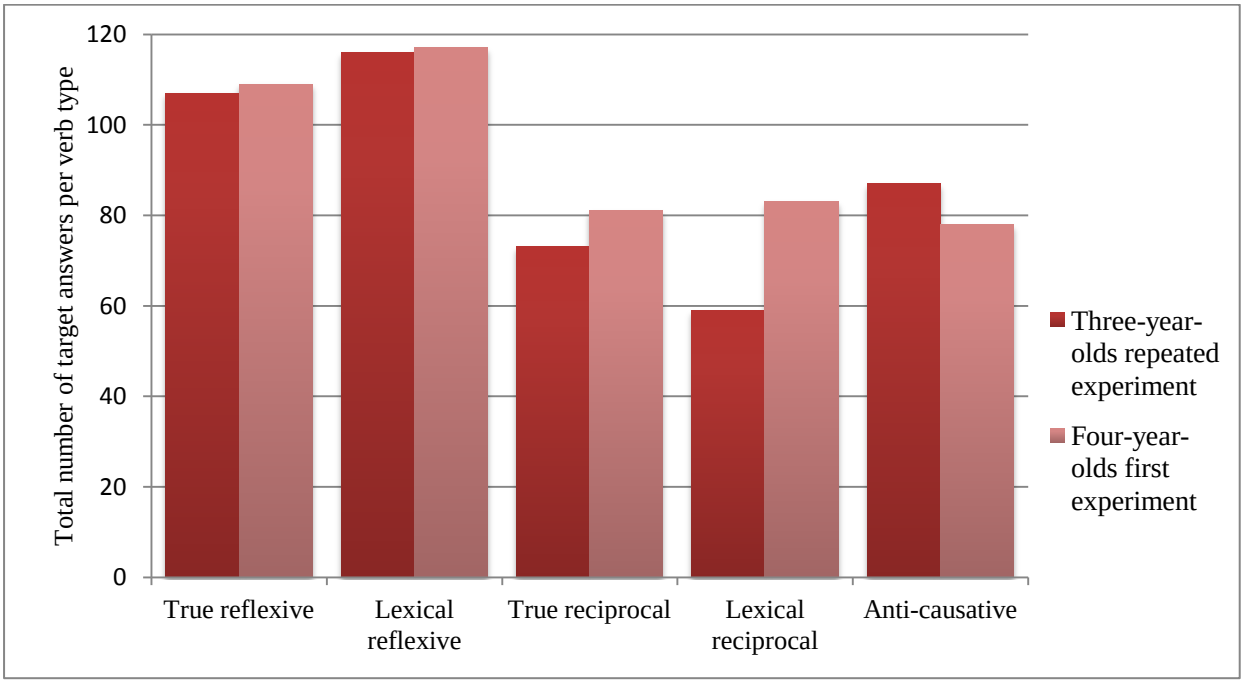


Figure 15 – Three-year-olds' production in the follow-up experiment vs. four-year-olds' production in the first experiment

After a nine-month period, the production of all verb types was over 100 verbs in the group of four-year-olds. The production of true reflexive verbs reached 95% (N=114, M=5.7, SD=0.66) with an increase of 5 verbs in comparison with the first experiment, and the production of lexical reflexive verbs was 100% (N=120, M=6, SD=0), with an increase of 3 verbs. The production of other verb types improved noticeably, as it is presented in Figure 16. There were 24 more true reciprocal verbs produced, which means that the production of true

reciprocal verbs reached almost 90% (N=105, M=5.25, SD=0.91). There were 21 more lexical reciprocal verbs produced (N=104, M=5.2, SD=0.83), and 24 more anti-causative verbs (N=102, M=5.1, SD=0.85), which means that the production of anti-causative verbs reached 85%.

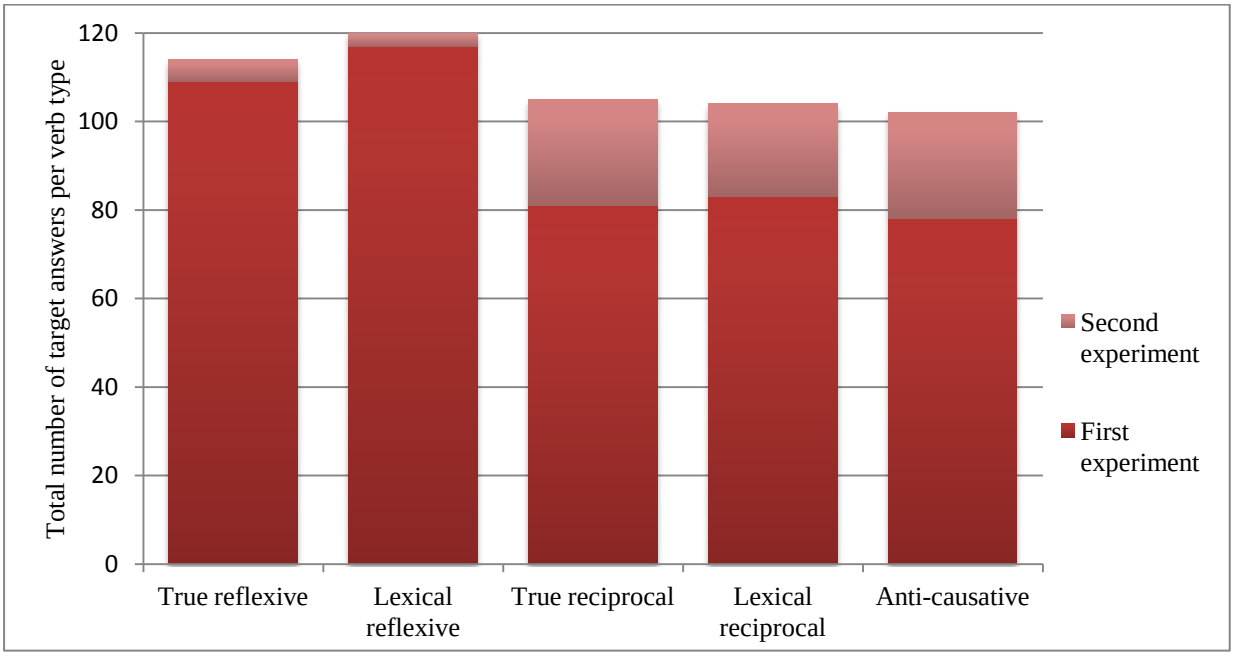


Figure 16 – Increase in the verb production of four-year-olds after a nine-month period

As it can be seen in Figure 17, the number of verbs produced in the group of four-year-olds was very similar to the number of verbs produced by five-year-olds nine months earlier. The difference in the production never exceeded 10 verbs. There were four more true reflexive verbs, and one more lexical reflexive verb produced by four-year-olds in the follow-up experiment. There were seven more true reciprocal and lexical reciprocal verbs produced, and ten more anti-causative verbs. Therefore, the overall production of four-year-olds in the follow-up experiment was slightly more successful than the production of five-year-olds nine months earlier. The better results obtained for four-year-olds nine months later than for five-year-olds in the first experiment could be contributed to the effect of the repeated experiment, which the children were already familiar with. However, then it would seem reasonable to expect to see the same difference in the production between three-year-olds nine months later

and four-year-olds in the follow-up experiment, which was not the case. Moreover, as it was mentioned before, many children did not even remember doing the first experiment. Therefore, the reason for the better production of four-year-olds should be sought elsewhere – possibly in generational differences, which are often noticed in cross-sectional studies (Jerković–Zotović, 2015).

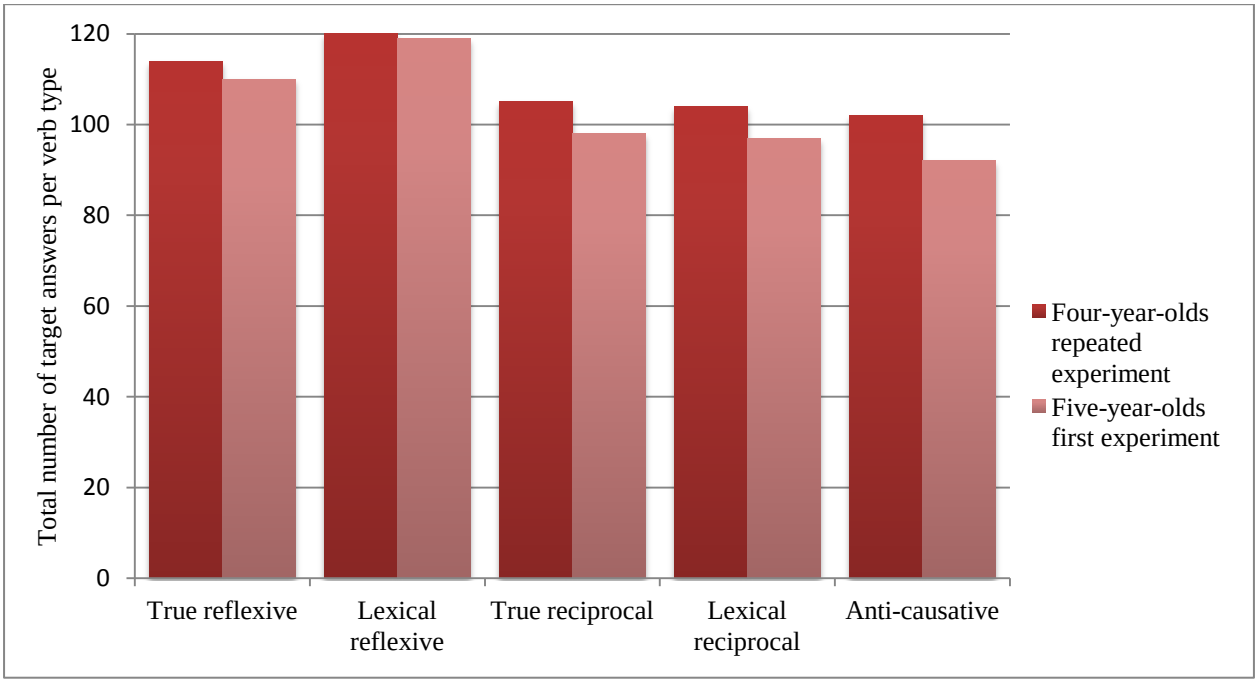


Figure 17 – Four-year-olds' production in the follow-up experiment vs. five-year-olds' production in the first experiment

The production of five-year-olds in the follow-up experiment gave very similar results. The production of true reflexive verbs (N=113, M=5.65, SD=0.59) and lexical reflexive verbs (N=120, M=6, SD=0) was virtually the same as the production in the group of four-year-olds in the follow-up experiment. As for the remaining verb types, there were five more verbs produced for each type. In comparison with the results from nine months earlier, presented in Figure 18, there were three more true reflexive verbs produced, and one more lexical reflexive verb produced. The production of other verb types improved as well. With an increase of 12 verbs for each verb type, the production of true reciprocal verbs (N=110, M=5.5, SD=0.76) and lexical reciprocal verbs (N=109, M=5.45, SD=0.99) was above 90% for the first time in the study. The production of anti-causative verbs increased by 15 verbs

(N=107, M=5.35, SD=0.81). It reached 89%, which was the highest percentage of anti-causative verbs produced in the study.

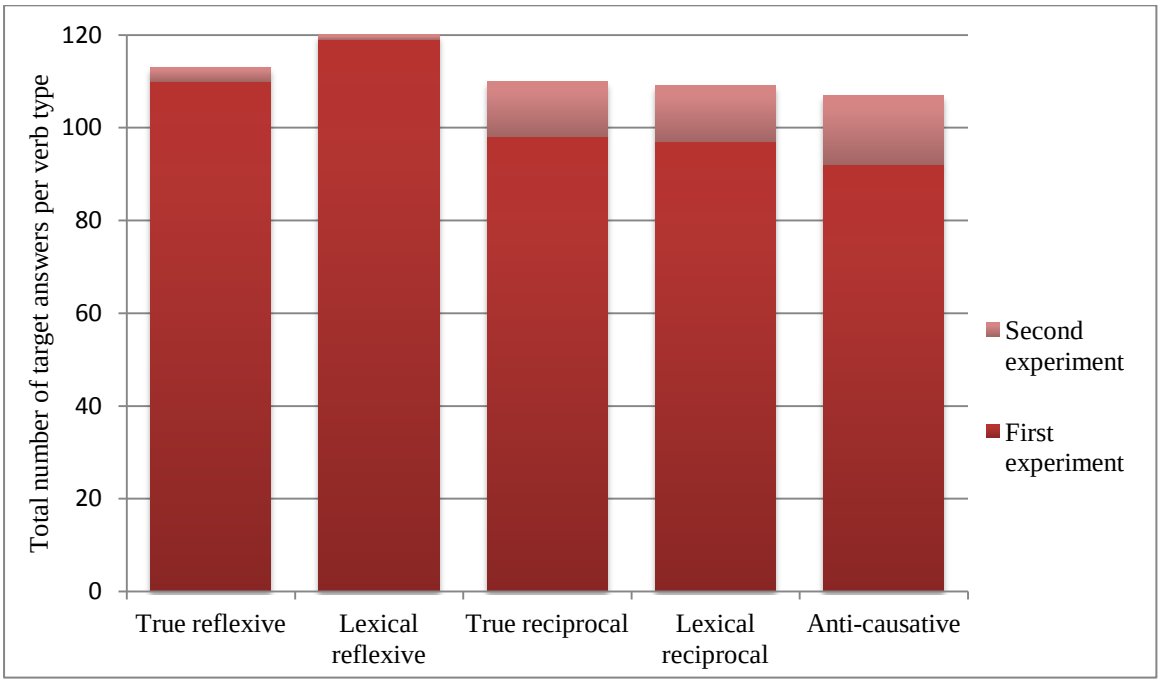


Figure 18 – Increase in the verb production of five-year-olds after a nine-month period

The data from the longitudinally repeated experiment confirm the tendencies observed in the first experiment. The results indicate that the developmental pattern of the acquisition of the tested *se*-verbs in Serbian starts with lexical and true reflexive verbs, whereas the acquisition of true reciprocal, lexical reciprocal, and anti-causative *se*-verbs is delayed. It appears that the production of these verb-types improves considerably betweeen the ages of four and five. We proceeded to statistical analyses conducted on the samples from the three age groups in order to determine whether the differences in the production between the five verb types would prove statistically significant.

5.2.1.1. Three-year-olds

All GLMER analyses that were conducted in the first experiment were repeated with novel data. The results of the GLMER analyses with two levels of the verb type effect for the

youngest tested group show that there was no difference between the production of **true and lexical reflexive** (β=1.637; z=1.656; Pr(>|z|)=.097) or **true and lexical reciprocal verbs** (β=.113; z=.075; Pr(>|z|)=.927). The result was the same for the production of **true reciprocal and anti-causative verbs** (β=.400; z=.758; Pr(>|z|)=.346). Verb length and frequency effects were not found either. All the tables are given in Appendix 8a.

However, the GLMER analyses with three levels of the verb type effect gave significant results. The results of the GLMER analysis comparing the production of **true reflexive, lexical reflexive, and true reciprocal verbs** presented in Table 31 show that true reciprocal verbs were produced with less success than lexical reflexive verbs (β=-3.811; z=-2.047; Pr(>|z|)=.040*). No other effects were found.

Random effects			*Variance*	*SD*
Subject : Intercept			.964	.982
Stimuli : Intercept			4.471	2.114
Fixed effects	***Estimate***	***SE***	***z-value***	***p-value***
Intercept (lexical reflexive)	5.297	1.566	3.383	.000***
Trial Order	-.011	.024	-.488	.625
Verb Length	-.367	.412	-.891	.372
Verb Frequency	-.010	.780	-.013	.989
Verb Type (true reflexive)	-1.970	1.921	-1.026	.304
Verb Type (true reciprocal)	-3.811	1.861	-2.047	.040*

Table 31 – True reflexive, lexical reflexive, and true reciprocal GLMER analysis on the sample of 3-year-olds

Similarly, the GLMER model comparing the production of **true reflexive, lexical reflexive, and anti-causative verbs** shows that lexical reflexive verbs were produced significantly better than anti-causative verbs (β=2.930; z=2.397; Pr(>|z|)=.016*), but the difference between the production of true reflexive and anti-causative verbs was not found (β=1.228; z=1.313; Pr(>|z|)=.189). As it can be seen in Table 32, no other effects were found.

Random effects			*Variance*	*SD*
Subject : Intercept			.405	.636
Stimuli : Intercept			.961	.980

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	.954	.743	1.282	.199
Trial Order	.016	.021	.784	.433
Verb Frequency	-.205	.417	-.493	.926
Verb Length	-.036	.390	-.092	.926
Verb Type (lexical reflexive)	2.930	1.222	2.397	.016*
Verb Type (true reflexive)	1.228	.935	1.313	.189

Table 32 – True reflexive, lexical reflexive, and anti-causative GLMER analysis on the sample of 3-year-olds

When it comes to inter-subject variability in producing individual verb types (provided in Figure 19), SD was below 1 for true reflexive verbs (SD=0.81), lexical reflexive verbs (SD=0.41), and true reciprocal verbs (SD=0.93). As many as 90% of the three-year-olds produced five or six target true reflexive verbs. Half of these participants produced the maximum number of true reflexive verbs, and eight of them produced five target true reflexive verbs. Four and three true reflexive verbs were produced only once each. Inter-subject variability was the lowest in producing lexical reflexive verbs. In 80% of the cases three-year-olds produced the maximum number of lexical reflexive verbs, whereas 20% of the participants in this age group produced five lexical reflexives. When it comes to the production of true reciprocal verbs, 80% of the three-year-olds produced three or four target verbs (nine and seven participants, respectively). Two participants produced five target answers. Interestingly, there was one participant who reached maximum production, and one participant who produced only two target verbs, which was the lowest number of true reciprocal verbs produced in this group.

As illustrated in Figure 19, inter-subject variability was more than 1 in the production of lexical reciprocal verbs (SD=1.79) and anti-causative verbs (SD=1.23). The range of lexical reciprocal verbs produced was from 0 to 6, and that was the highest inter-subject variability in both experiments. Three children still failed to produce any lexical reciprocal verbs (in the

first experiment there were six such participants), and one subject produced only one lexical reciprocal (whereas in the first experiment as many as five participants did so). Four children produced two target answers, three of them produced three, and five of them produced four. There were three participants who produced five target lexical reciprocal verbs and one participant who produced the maximum number of target answers, which did not happen in the first experiment.

Inter-subject variability in producing anti-causative verbs was not very high. There were no children who failed to produce any anti-causatives (compared to three such participants in the first experiment) or produced only one anti-causative verb (compared to three participants in the first experiment). Only one child produced two target verbs. Five three-year-olds produced half of the targeted anti-causatives, whereas four of them produced four. The other half were very successful, producing five (six participants) or six target anti-causative verbs (four participants). For individual changes in the number of produced verbs per type in the two experiments, see Appendix 9a.

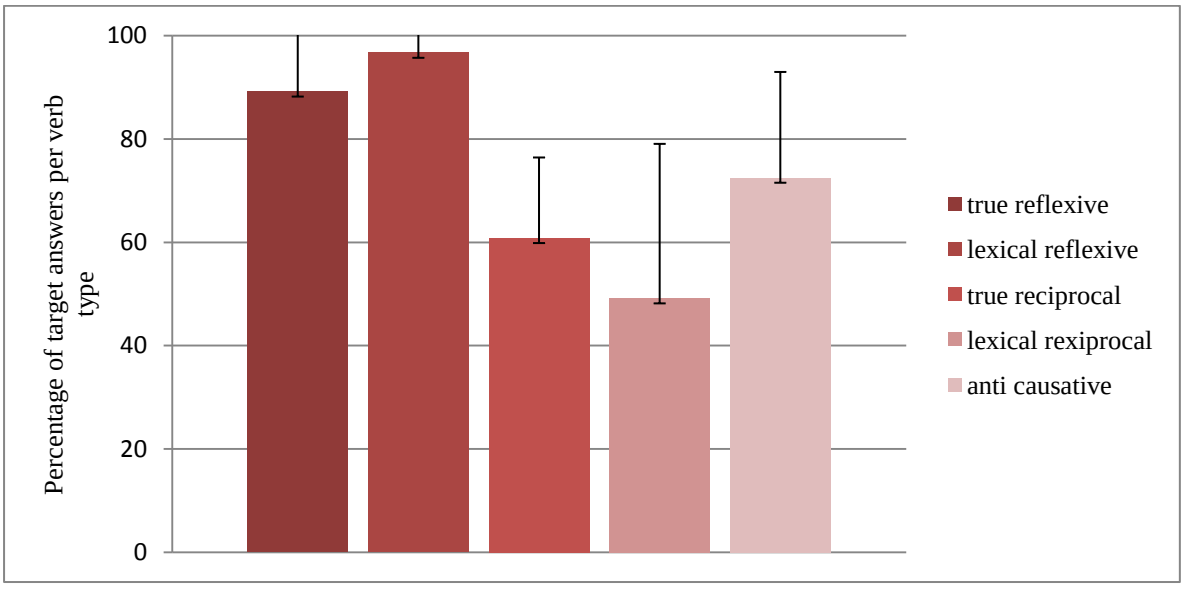


Figure 19 – Verb production and SD in the group of three-year-olds in the follow-up experiment

5.2.1.2. Four-year-olds

When it comes to the GLMER model comparing **true and lexical reflexive verbs** produced by this group of participants, no difference in production was found (β=-4.602e+01; z=.002; Pr(>|z|)=.998). No difference in the production of **true and lexical reciprocal verbs** was found, either (β=-.397; z=-.260; Pr(>|z|)=.795). No other effects were found, either. The result was the same for the comparison of the production of **true reciprocal and anti-causative verb types** (β=.282; z=.205; Pr(>|z|)=.837). All the tables are given in Appendix 8b.

For the first time in both experiments, the GLMER analysis analysing the production of **true reflexive verbs, lexical reflexive verbs, and true reciprocal verbs** did not give any significant results, which can be seen in Table 33.

Random effects			*Variance*	*SD*
Subject : Intercept			2.475	1.573
Stimuli : Intercept			1.731	1.316

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	5.358e+00	1.298e+00	4.183	.000***
Trial Order	-2.819e-0	3.614e-02	-.078	.938
Verb Frequency	1.160e+00	7.122e-01	1.628	.103
Verb Length	-5.351e-01	4.045e-01	-1.323	.186
Verb Type (lexical reflexive)	1.583e+01	2.718e+03	.006	.995
Verb Type (true reflexive)	-1.464e+00	1.109e+00	-1.320	.187

Table 33 – True reflexive, lexical reflexive, and true reciprocal GLMER analysis on the sample of 4-year-olds

Likewise, there were no significant differences between the production of **true reflexive, lexical reflexive, and anti-causative verbs**, which is presented in Table 34.

Random effects			*Variance*	*SD*
Subject : Intercept			.078	.280
Stimuli : Intercept			1.198	1.094

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	1.768	.919	1.923	.054.
Trial Order	.049	.028	1.738	.082.
Verb Frequency	.397	.610	.651	.514
Verb Length	-.119	.479	-.250	.802
Verb Type (lexical reflexive)	9.676	24.077	.041	.967
Verb Type (true reflexive)	1.085	1.157	.938	.348

Table 34 – True reflexive, lexical reflexive, and anti-causative GLMER analysis on the sample of 4-year-olds

As shown in Figure 20, inter-subject variability among four-year-olds was below 1 in producing all verb types. When it comes to the production of true reflexive verbs (SD=0.66), 80% of four-year-olds reached maximum production. In the remaining cases, both five and four target true reflexive verbs were produced by two children. In the case of lexical reflexive verbs, inter-subject variability was zero (SD=0), since all the participants produced all the verbs.

Inter-subject variability was higher in producing true reciprocal verbs (SD=0.91). As many as 50% of the four-year-olds reached maximum production. Five true reciprocal verbs were given by six participants, four were provided by three participants, and only three true reciprocal verbs were produced by one four-year-old.

There were not as many children who produced the maximum number of lexical reciprocal verbs in the group of four-year-olds (SD=0.83). Six target answers were given in only 40% of the cases (by eight participants), whereas five target answers were given by nine participants. Two participants produced four target answers, and one four-year-old produced only three target answers.

Finally, inter-subject variability in the production of anti-causative verbs was similar (SD=0.85). There were only seven four-year-olds (35%) who produced the maximum number of anti-causative verbs. Nine of them produced five target answers, three produced four, and

one produced only three. For individual changes in the number of produced verbs per type among four-year-olds in the two experiments, see Appendix 9b.

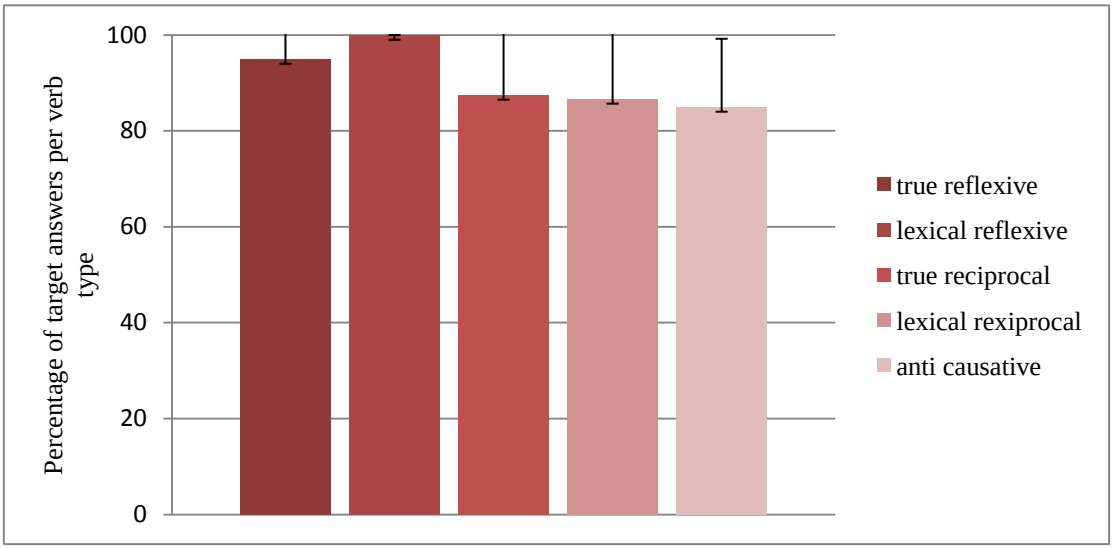


Figure 20 –Verb production and SD in the group of four-year-olds

5.2.1.3. Five-year-olds

Once again, the analyses with two levels of the verb type effect did not give any significant results. There was no difference between the production of **true reflexive and lexical reflexive verbs** (β=-19.255; z=-.003; Pr(>|z|)=.998), **true reciprocal and lexical reciprocal verbs** (β=-1.086; z=-.702; Pr(>|z|)=.476), or **true reciprocal and anti-causative verbs** (β=.301; z=.157; Pr(>|z|)=.875). All the tables are given in Appendix 8c.

As was the case in the group of four-year-olds, there were no differences found between the production of **true reflexive, lexical reflexive, and true reciprocal verbs**, as shown in Table 35.

Random effects			*Variance*	*SD*
Subject : Intercept			.632	.795
Stimuli : Intercept			.264	.514

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reflexive)	2.157e+01	4.711e+03	.005	.996
Trial Order	-5.525e-03	5.207e-02	-.106	.916
Verb Frequency	7.131e-01	4.436e-01	1.608	.108
Verb Length	-3.318e-01	2.743e-01	-1.210	.226
Verb Type (true reflexive)	-1.774e+01	4.711e+03	-.004	.997
Verb Type (true reciprocal)	-1.841e+01	4.711e+03	-.002	.999

Table 35 – True reflexive, lexical reflexive and true reciprocal GLMER analysis on the sample of 5-year-olds

No differences were found between the production of **true reflexive, lexical reflexive, and anti-causative verbs** either, as shown in Table 36.

Random effects			*Variance*	*SD*
Subject : Intercept			1.152	1.073
Stimuli : Intercept			1.564	1.251

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	1.989e+00	1.129e+00	1.762	.078
Trial Order	6.954e-02	3.515e-02	1.978	.047
Verb Frequency	2.881e-01	6.577e-01	.438	.661
Verb Length	2.358e-01	6.839e-01	.345	.730
Verb Type (lexical reflexive)	1.803e+01	2.604e+03	.007	.994
Verb Type (true reflexive)	9.832e-01	1.369e+00	.718	.472

Table 36 – True reflexive, lexical reflexive and anti-causative GLMER analysis on the sample of 5-year-olds

Figure 21 shows that inter-subject variability among five-year-olds was below 1 for all verb types. When it comes to the production of true reflexive verbs (SD=0.59), as many as 70% of the five-year-olds reached maximum production of true reflexive verbs. Five children provided five target true reflexive verbs, and one four. As it was the case in the previous group, inter-subject variability in producing lexical reflexive verbs was zero (SD=0), since all the participants produced all the verbs.

However, there was inter-subject variability in producing true reciprocal (SD=0.76), lexical reciprocal (SD=0.99), and anti-causative verbs (SD=0.81). Namely, 65% of the five-year-olds reached maximum production of true reciprocal verbs, but five true reciprocal verbs were

given by four children in this age group and three of them produced four true reciprocals. Similarly, 70% of the five-year-olds reached maximum production of lexical reciprocal verbs, whereas five target lexical reciprocal verbs produced by three children, and four target verbs by one participant. Only three target answers were provided by two five-year-olds. A wider range of answers resulted in higher standard deviation for this verb type (for a complete picture see Appendix 9c).

Finally, 55% of the five-year-olds reached maximum production of anti-causative verbs, whereas five of them produced five target answers, and four produced four. For individual changes in the number of produced verbs per type among five-year-olds in the two experiments, see Appendix 9c.

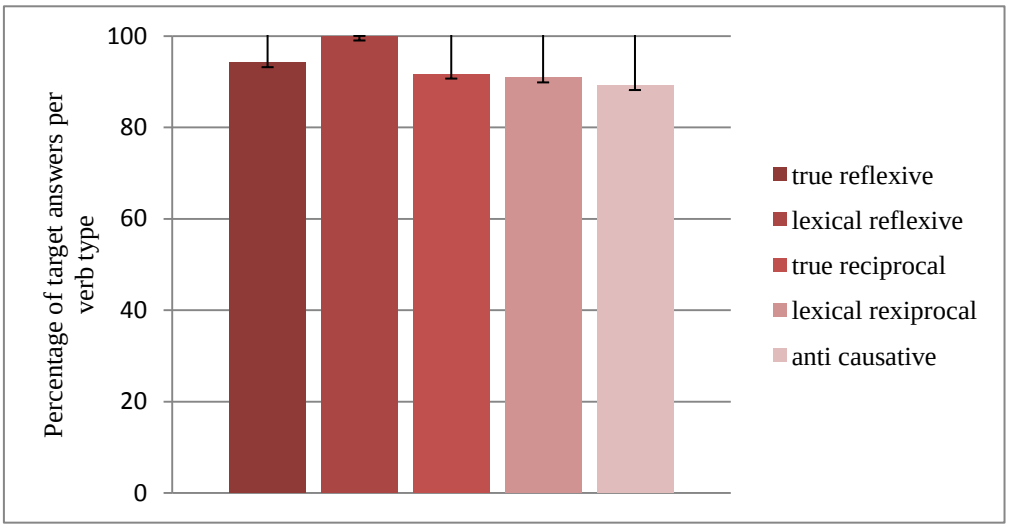


Figure 21 – Verb production and SD in the group of five-year-olds

It can be concluded that the results obtained on the sample of four-year-olds and five-year-olds after a nine-month period did not differ considerably in any respect.

5.2.1.4. Interpretation of results

The results of the follow-up experiment have confirmed that the production of lexical reflexive verbs is most accurate since their production was better than the production of true

reciprocal and anti-causative verbs in the youngest group tested, which corresponds to the initial hypothesis (that reflexive verbs are acquired before reciprocal and anti-causative verbs). However, no significant differences were found between any verb type in the two older groups after a nine-month period, which indicates that the production of more complex verb types improves considerably betweeen the ages of four and five. The results of the follow-up experiment suggest that lexicality does not seem to play an important factor in producing reflexive or reciprocal verbs at later stages of language acquisition, which answers the second research question. However, it should be stressed that only lexical reflexive verbs proved to be produced significantly better than both true reciprocal and anti-causative verbs (in the GLMER analyses with three levels of the verb type effect) in the youngest tested group, which implies that their production is better than the production of true reflexive verbs at this stage of language acquisition.

Based on the results obtained in the first experiment, we expected to see some of the differences noted in the group of five-year-olds nine months earlier in the group of four-year-olds in the follow-up experiment, and yet, this was not the case. As it has already been suggested, it might be the case that the lack of differences found in this group came as a result of generational differences. For a more general discussion of the results obtained, see Chapter 6.

The results of the statistical analyses indicate that the differences in producing different verb types can no longer be found around the age of five. We proceeded to the statistical analyses per verb type in order to determine the age at which the difference in producing a certain verb type ceases to be significant.

5.2.2. Development of production per verb type

The results of the GLMER analysis comparing the production of **true reflexive verbs** in the three age groups after a nine-month period are graphically presented in Figure 22. The y-axis shows the total number of target answers out of 120 observations per age group. The analysis shows that the difference in the production of true reflexive verbs was not significant between three-year-olds and four-year-olds (β=.879; z=1.701; Pr(>|z|)=.089), or even between three-year-olds and five-year-olds (β=.692; z=1.407; Pr(>|z|)=.159) after a nine-month period. There was no difference in the production of true reflexive verbs between four-year-olds and five-year-olds either (β=-.187; z=-.326; Pr(>|z|)=.744). An effect of verb length was found, though (β=-.349; z=-1.961; Pr(>|z|)=.049*), whereas there was no effect of verb frequency on the production of true reflexive verbs (β=-.104; z=-.471; Pr(>|z|)=.637). If we recall the results from the first experiment, which showed that there was no difference in the production of true reflexive verbs between four-year-olds and five-year-olds even nine months earlier, it can be concluded that this verb type is acquired at a relatively young age. Complete tables with results of the statistical analyses of the production of separate verb types across the groups are provided in Appendix 8d.

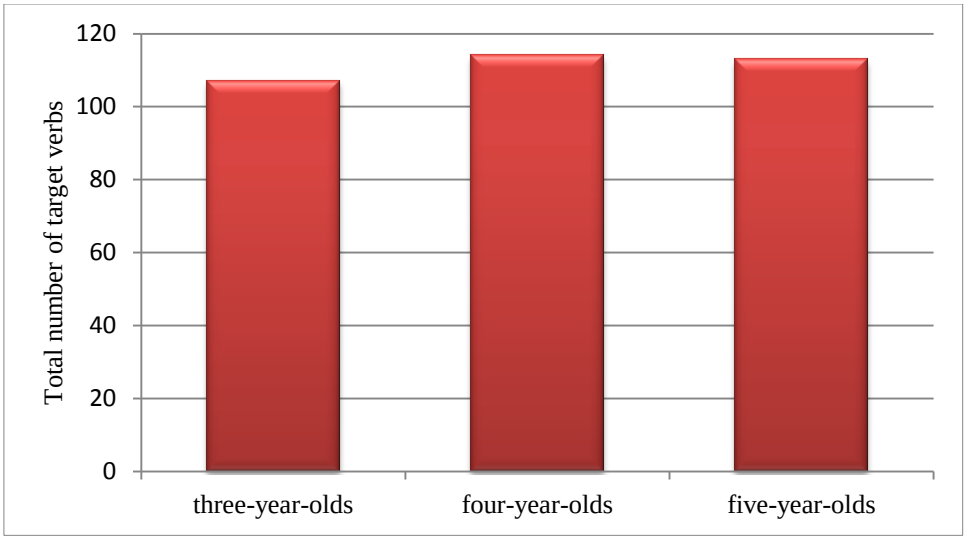


Figure 22 – Differences in true reflexive verb production between groups

Table 37 shows the production of individual true reflexive verbs, given in percentages. The numbers in brackets represent the increase in the number of verbs produced in comparison with the results from the first experiment. What can be seen is that the production of the verb *oblačiti se* 'dress' was still the least successful in the group of three-year-olds after a nine-month period, although there was a 20% increase in its production. The production of the verb *umivati se* 'wash one's face' improved by a quarter compared to its production by the same group, nine months earlier. Overall, there were thirteen more true reflexive verbs produced in this group. Three boys could still not produce the verb *šminkati se* 'put on make-up', and the verb *brisati se* 'dry oneself' was not produced by three girls, who preferred the transitive verb. All the four-year-olds produced the verbs *oblačiti se* 'dress', *umivati se* 'wash one's face', and *kupati se* 'bathe', while all the five-year-olds produced the verbs *umivati se* 'wash one's face' and *kupati se* 'bathe'. The production was never below 90% for any of the tested verbs in these two groups.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
oblačiti se 'dress'	75% (+4)	100% (+2)	95%
umivati se 'wash one's face'	95% (+5)	100% (+2)	100% (+2)
brisati se 'dry oneself'	85% (+2)	90% (+1)	90% (+1)
kupati se 'bathe'	100%	100%	100%
češljati se 'comb oneself'	95% (+1)	90%	90%
šminkati se 'put on make-up'	85% (+1)	90%	90%

Table 37 – Production of individual true reflexive verbs

The second GLMER analysis comparing the production of **lexical reflexive verbs** across the age groups has given the same results, presented in Figure 23. The production of five-year-olds was no longer significantly better than the production of three-year-olds (β=3.414e+01; z=.001; Pr(>|z|)=.999). Furthermore, there was no difference in the production of lexical

reflexive verbs between four-year-olds and three-year-olds (β=4.424e+01; z=.002; Pr(>|z|)=.998). There was no difference in the production between four-year-olds and five-year-olds, either (β=9.520e+00; z=-.002; Pr(>|z|)=.998). Therefore, the results of the follow-up experiment confirm that lexical reflexive verbs are fully acquired around the age of four as well. An effect of verb length was found (β=1.517e+00; z=1.983; Pr(>|z|)=.047*), but there was no effect of frequency on the production of lexical reflexive verbs (β=7.318e-01; z=1.082; Pr(>|z|)=.279).

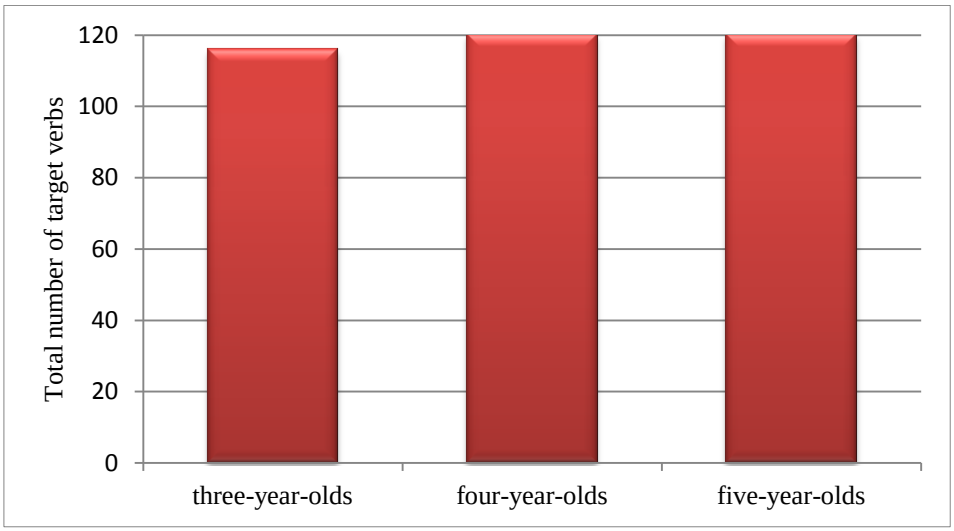


Figure 23 – Differences in lexical reflexive verb production between groups

The production of each individual verb belonging to the category of lexical reflexive verbs was successful, as shown in Table 38. The production was not lower than 85% for any verb in the youngest group tested; in fact, it reached 100% for all the verbs except for the verbs *vrteti se* 'spin' and *smejati se* 'laugh'. The production of the verb *smejati se* 'laugh' improved by a quarter. Overall, there were eleven more verbs produced in this group. Four-year-olds and five-year-olds reached maximum production for all the verbs, even the verb *vrteti se* 'spin', which was more difficult in the first experiment.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
igrati se 'play'	100% (+3)	100%	100%
penjati se 'climb'	100% (+1)	100%	100%
vrteti se 'spin'	85% (+2)	100% (+3)	100% (+1)
smejati se 'laugh'	95% (+5)	100%	100%
ljuljati se 'swing'	100%	100%	100%
spuštati se 'slide'	100%	100%	100%

Table 38 – Production of individual lexical reflexive verbs

As opposed to the results obtained for true and lexical reflexive verbs, the next GLMER analysis found significant differences in the production of **true reciprocal verbs** after a nine-month period. As Figure 24 graphically presents, the production of true reciprocal verbs was the most successful in the oldest group and the least successful in the youngest one. True reciprocal verbs were produced more accurately by five-year-olds than by three-year-olds (β=2.939; z=6.126; Pr(>|z|)=.000***), as well as by four-year-olds than by three-year-olds (β=2.399; z=5.457; Pr(>|z|)=.000***). Therefore, the results replicate some of the differences that were found between the tested groups in the first experiment. However, the difference in the production between four-year-olds and five-year-olds could no longer be found after a nine-month period (β=.539; z=1.154; Pr(>|z|)=.248). The results thus confirm that the developmental pattern of true reciprocal verbs takes a longer time than that of true and lexical reflexive verbs. Moreover, they indicate that true reciprocal verbs are not fully acquired around the age of five. Importantly, both the effect of verb frequency (β=2.635; z=2.286; Pr(>|z|)=.022*) and the effect of verb length (β=-3.332; z=-2.551; Pr(>|z|)=.010*) were found with this type of *se*-verbs, as was the case in the first experiment.

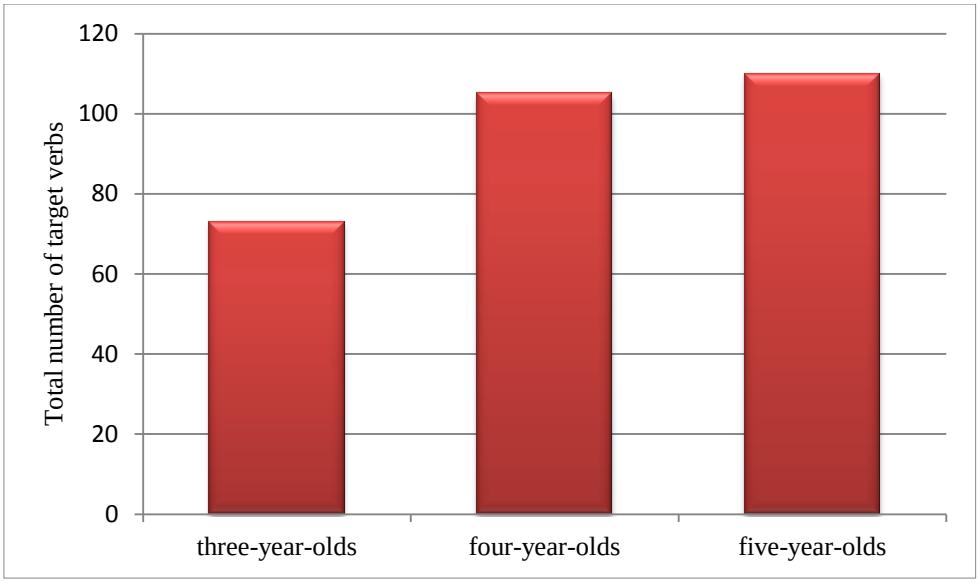


Figure 24 – Differences in true reciprocal verb production across groups

As was the case in the first experiment, the verbs *grliti se* 'hug each other', *ljubiti se* 'kiss each other', and *tući se* 'fight with each other' were produced successfully, whereas the verbs *juriti se* 'chase each other', *gađati se* 'throw something at each other', and *gledati se* 'look at each other' remained more difficult for children to produce. Their production was especially low in the youngest group tested. However, it improved in the group of four-year-olds, as it can be seen in Table 39. There were six more target answers for the verb *juriti se* 'chase each other', eight more for the verb *gađati se* 'throw something at each other', and four more for the target verb *gledati se* 'look at each other'.

Even with an increase of seven verbs in comparison with the results from the first experiment, the production of the verb *juriti se* 'chase each other' remained the lowest in the oldest group. The statistical analysis showed that the effect of frequency of individual verbs was significant, but this was expected, as this was the verb with the lowest frequency in srWaC. On the other hand, the production of the verb with the highest frequency in srWaC, the verb *gledati se* 'look at each other', was low only in the youngest tested group, whereas it reached 90% in the oldest group in the follow-up experiment.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
grliti se 'hug each other'	100% (+2)	100%	100% (+1)
ljubiti se 'kiss each other'	95% (+3)	100% (+6)	100%
tući se 'fight with each other'	100% (+4)	100%	100%
juriti se 'chase each other'	15% (+1)	60% (+6)	75% (+7)
gađati se 'throw something at each other'	35% (+6)	80% (+8)	85% (-1)
gledati se 'look at each other'	20% (+3)	85% (+4)	90% (+5)

Table 39 – Production of individual true reciprocal verbs

The fourth GLMER analysis gave similar results for the production of **lexical reciprocal verbs**. As it can be seen in Figure 25, there was a sharp increase in the production of lexical reciprocal verbs in the group of four-year-olds. Four-year-olds produced lexical reciprocal verbs significantly better than three-year-olds (β=2.414; z=6.132; Pr(>|z|)=.000***), as was the case with five-year-olds in comparison with three-year-olds (β=2.830; z=6.355; Pr(>|z|)=.000***). However, the difference in the production between four-year-olds and five-year-olds was not found after a nine-month period (β=.415; z=.920; Pr(>|z|)=.357). A significant difference in comparison with the results obtained for true reciprocal verbs (and in comparison with the results for lexical reciprocal verbs obtained in the first experiment) was that neither an effect of frequency (β=.558; z=1.185; Pr(>|z|)=.236) nor an effect of verb length (β=.658; z=1.431; Pr(>|z|)=.152) was found.

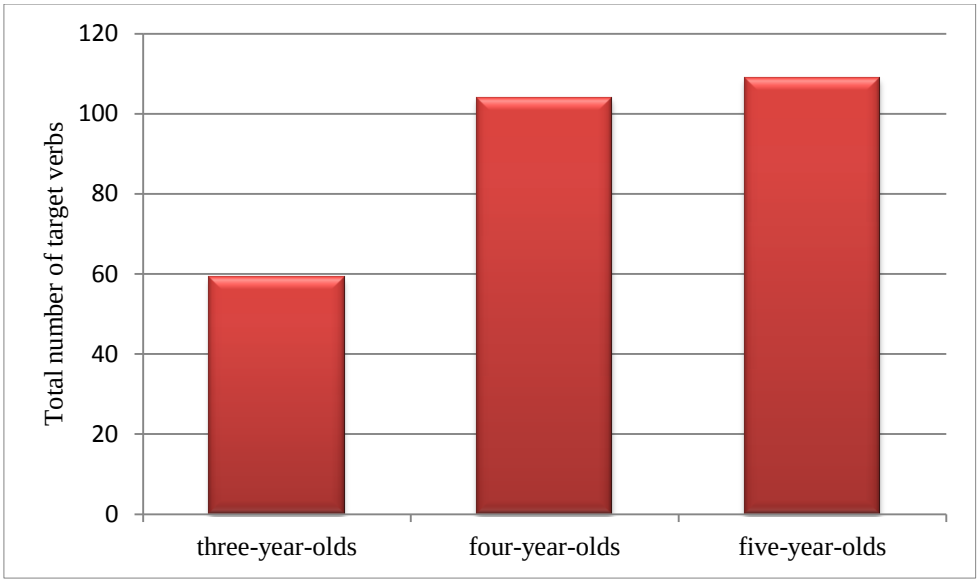


Figure 25 – Differences in lexical reciprocal verb production across groups

Table 40 shows the percentage of correctly produced lexical reciprocal verbs, as well as their increase in comparison with the participants' production in the first experiment. The production of individual lexical reciprocal verbs doubled in the group of three-year-olds after a nine-month period. The production of the verbs *mačevati se/boriti se* 'fence/fight', *dobacivati se* 'throw a ball at each other', and *sudariti se* 'collide' reached 65%. There was an increase of five or more target answers for each of the target verbs except for the verb *rukovati se* 'shake hands', for which there was only one more target answer produced. The production of this verb remained the lowest in all the three groups, although its production reached 65% in the group of four-year-olds and 75% in the oldest group. On the other hand, the production of the most frequent lexical reciprocal verb tested (according to srWaC), the verb *mačevati se/boriti se* 'fence/fight' reached maximum production in the groups of four-year-olds and five-year-olds, which was the case in the first experiment as well. Another verb that reached maximum production in the group of four-year-olds was the verb *sudariti se* 'collide', whereas the verb *dobacivati se* 'throw a ball at each other' reached maximum production in the oldest group, although this was the verb with the lowest frequency in srWaC.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
svađati se 'argue'	50% (+6)	95% (+2)	85%
trkati se 'race'	35% (+6)	70% (+4)	90% (+3)
mačevati se/boriti se 'fence/fight'	65% (+7)	100% (+2)	100%
rukovati se 'shake hands'	15% (+1)	65% (+5)	75% (+4)
dobacivati se 'throw a ball at each other'	65% (+5)	90% (+5)	100% (+4)
sudariti se 'collide'	65% (+5)	100% (+3)	95% (+1)

Table 40 – Production of individual lexical reciprocal verbs

The last GLMER analysis comparing the production of **anti-causative verbs** across the groups replicated some of the findings for true and lexical reciprocal verbs. Five-year-olds produced anti-causative verbs significantly better than three-year-olds after a nine-month period (β=1.434; z=3.538; Pr(>|z|)=.000***). Moreover, anti-causative verbs were produced more accurately at the age of four than at the age of three (β=1.010; z=2.731; Pr(>|z|)=.006**). However, no difference in the production between four-year-olds and five-year-olds was found (β=.424; z=.998; Pr(>|z|)=.318), as it was the case in the first experiment. As with lexical reciprocal verbs, neither the frequency effect (β=-.025; z=-.047; Pr(>|z|)=.962), nor the effect of verb length (β=-.093; z=-.318; Pr(>|z|)=.750) was found. The results are presented in Figure 26.

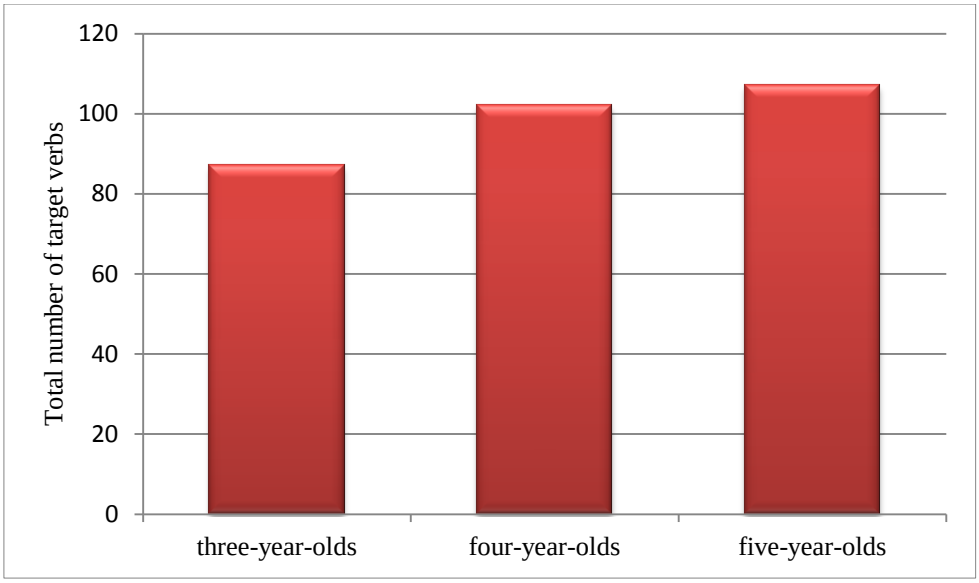


Figure 26 – Differences in anti-causative verb production across groups

Table 41 shows the production of individual anti-causative verbs in the follow-up experiment. Out of all the tested verb types, the production of anti-causatives improved the most in the youngest group. There was an increase of seven or eight target answers for all the verbs except for the verb *ugasiti se* 'go out', which remained the same. The production of all other anti-causative verbs was between 65% and 95%. As opposed to the increase in the production of anti-causative verbs, which was more evenly distributed in the youngest group, in the group of four-year-olds, the production of the verbs *upaliti se* 'turn on' and *ugasiti se* 'go out' improved by nine and seven target verbs, respectively. This resulted in the production of all the verbs reaching 70% or more. The production of the verbs *otvoriti se* 'open' and *pokvariti se* 'stop working' reached maximum production. The results from the group of five-year-olds show that the verb *ugasiti se* 'go out' remained the most difficult to produce (55%). The production of the other anti-causative verbs was never below 85%.

Verbs/Groups	Three-year-olds	Four-year-olds	Five-year-olds
otvoriti se 'open'	85% (+8)	100% (+4)	100% (+1)
zatvoriti se 'close'	80% (+8)	70%	95% (+6)
upaliti se 'turn on'	65% (+7)	75% (+9)	90% (+2)
ugasiti se 'go out'	30%	70% (+7)	55% (+3)
pokvariti se 'stop working'	95% (+7)	100% (+1)	95%
polomiti se 'break'	80% (+7)	95% (+3)	85% (+3)

Table 41 – Production of individual anti-causative verbs

Therefore, the results of the follow-up experiment confirm that true and lexical reflexive verbs are acquired before true reciprocal, lexical reciprocal, and anti-causative verbs. The age after which the difference in the production of true and lexical reflexive verbs stops being significant is around four, whereas the age after which the difference in the production of true reciprocal, lexical reciprocal and anti-causative verbs stops being significant is around five. It is important to note that an effect of verb length was found with all the verb types except lexical reciprocal and anti-causative verbs (there was no effect of verb length on the production of anti-causative verbs, and it was only marginal in the case of lexical reflexive verbs in the first experiment), whereas a frequency effect was found only with true reciprocal verbs in the follow-up experiment (it was also found with lexical reciprocal verbs in the first experiment). This suggests that the two effects become less stable with age. Verb length still seems to have an inhibitory effect on the production of true reflexives, lexical reflexives, and true reciprocal verbs, whereas verb frequency facilitates only the production of true reciprocal verbs.

5.2.3. Non-target answers

5.2.3.1. True-reflexive verbs

The number of non-target answers for true reflexive verbs decreased in all the tested groups. There were 13 non-target answers in the group of three-year-olds, which is twice as low as the number of non-target answers in the same group in the first experiment (26). There were only 6 non-target answers in the group of four-year-olds (compared to 11 nine months earlier), and 7 in the group of five-year-olds (compared to 10 in the first experiment). As opposed to the non-target answers produced in the first experiment, in the follow-up experiment there were no clitic omissions, nouns, or cases when children did not produce any answer. The majority of non-target answers still belonged to the category of transitive variants of verbs, i.e. verbs with complements (20/26).

The number of verbs that were used with complements in the youngest group represented around 8% of all the children's answers for this verb type (9/120). Non-target verbs were used instead of the verbs *oblačiti se* 'dress' and *šminkati se* 'put on make-up' (3). Interestingly, one verb that was used instead of the target *šminka se* 'she is putting on make-up' was of the same syntactic complexity. In fact, the verb *farba se* 'she is painting herself' can be used in Serbian when a person dyes their hair, but not for the act of putting on make-up, which is why this verb could not be coded as 'target'. Finally, there was an interesting example of an existing verb used with the wrong valency, therefore coded as a 'made-up verb' – the verb *spušta se* 'he is SE pulling down'. The lexical reflexive verb can only be used with animate subjects to imply an activity of sliding/moving downwards (*Rečnik srpskoga jezika* [the Dictionary of the Serbian Language], 2011:1235). However, the participant produced it as a response to the stimulus eliciting the verb *oblači se* 'he is dressing', while her intention was to refer to the activity of pulling the shirt down, as she interpreted the presented situation. An appropriate response in case of such an interpretation

would have been *spušta majicu* ‘he is pulling his shirt down’, but that is a transitive verb, which could not be coded as target anyway.

As for the non-target answers in the other two groups, there were 5 transitive variants of true reflexive verbs and one answer categorized as ‘other’ produced in the group of four-year-olds, and 6 transitive variants and one non-target verb in the group of five-year-olds, which can be seen in Table 42. What needs to be pointed out is that the answer that was categorized as ‘other’ included both the clitic *se* and an object in producing the verb *češljati se* ‘comb oneself’. This was the only time in both experiments that a child produced a reflexive verb with an object. All the answers are provided in Appendix 10a.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	3 *farba se* paint.3sg.pres SE 'she is painting herself' instead of *šminka se* 'she is putting on make-up'	/	1 *ona koristi lak za usta* she.nom use.3sg.pres polish.acc for lips.acc 'she is using lip polish' instead of *šminka se* 'she is putting on make-up'	4
Transitive verbs Example	9 *češlja kosu* comb.3sg.pres hair.acc 'she is combing her hair' instead of *češlja se* 'she is combing herself'	5 *briše lice* dry.3sg.pres face.acc 'she is drying her face' instead of *briše se* 'she is drying herself'	6 *šminka usta* put on make-up.3sg.pres lips.acc 'she is putting on lipstick' instead of *šminka se* 'she is putting on make-up'	20
Target verbs without the clitic *se*	/	/	/	0
Made-up verbs Example	1 *se spušta* SE pull down.3sg.pres instead of *oblači se* 'he is dressing'	/	/	1
Nouns	/	/	/	0
Other Example	/	1 *pa se onda češljala kosu* so SE then.adv comb.3sg.past hair.acc 'so then she combed herself her hair' instead of *češlja se* 'she is combing herself'	/	1
No answer	/	/	/	0
Total number of non-target answers:	13	6	7	26

Table 42– Non-target answers for true reflexive verbs across groups

5.2.3.2. Lexical reflexive verbs

As it is shown in Table 43, the number of non-target answers for lexical reflexive verbs was reduced to only 4 in the youngest tested group (compared to 15 in the first experiment). There were only two categories of non-target answers observed: non-target verbs and no answer. Three non-target transitive and unergative verbs were produced instead of the target *vrteti se* 'spin'. One child did not give any answer for the target verb *smejati se* 'laugh'. There were no non-target answers in the groups of four-year-olds and five-year-olds in the follow-up experiment, since all the target verbs were produced.

Category	three-year-olds	four-year-olds	five-year-olds	Total:
Non-target verbs Example	3 pravi okrete make.3sg.pres turns.acc 'she is making turns' instead of vrti se 'she is spinning' pleše (2x) dance.3sg.pres 'she is dancing' instead of vrti se 'she is spinning'	/	/	3
Transitive verbs	/	/	/	0
Target verbs without the clitic *se*	/	/	/	0
Made-up verbs	/	/	/	0
Nouns	/	/	/	0
Other	/	/	/	0
No answer	1	/	/	1
Total number of non-target answers:	4	0	0	4

Table 43 – Non-target answers for lexical reflexive verbs across groups

5.2.3.3. True reciprocal verbs

As far as non-target answers for true reciprocal verbs are concerned, they are presented in Table 44. Their number was still higher than the number of non-target answers for true and lexical reflexive verbs after a nine-month period (72 versus 26 versus 4). However, the number of non-target verbs decreased: there were 47 non-target answers in the group of three-year-olds compared to 66 in the first experiment. The number of non-target answers

was more than twice as low in the groups of four-year-olds (15 compared to 39) and five-year-olds (10 compared to 22). Nearly 70% of the non-target answers in all three groups belonged to the category of non-target verbs (50/72 non-target answers). Non-target verbs formed more than a quarter of the total number of answers given for true reciprocal verbs in the group of three-year-olds (32/120). Their number was below 10% of the total number of answers in the other two groups (11 in the group of four-year-olds and 7 in the group of five-year-olds).

An important difference in comparison with non-target answers for true reciprocal verbs produced in the first experiment was noted with the category of transitive variants of verbs. The answers belonging to this category were more numerous (12/72 in comparison with 8/127), but more importantly, they occurred with the complement *jedan drugog* 'each other' used instead of the clitic *se* even in the youngest group, which was only produced in the oldest group in the first experiment. If the children did not use the complement, they used two coordinated transitive clauses *ona gleda u njega, a on gleda u nju* 'she is looking at him and he is looking at her'.

As far as other non-target answers are concerned, their number was much lower in the follow-up experiment. There were no omissions of the clitic *se* or nouns produced instead of verbs. There were only three made-up verbs (two produced in the youngest and one in the oldest group), and one answer categorised as 'other'. Two of the made-up verbs were produced in the first experiment as well (*bacaju se* 'they are throwing themselves' instead of *gađaju se* 'they are throwing something at each other'), whereas one was new, although its form is reminiscent of the form of the verb *zaljube se* 'they fall in love with each other'. It is probably the case that the participant mixed that verb with the target verb *ljube se* 'they are kissing each other' and produced **zaljubljaju se*. The answer categorised as 'other' included both the clitic *se* and the complement *jedan drugog* 'each other' in producing the verb *gledati*

se ‘look at each other’ (*gledaju se jedno drugo* ‘they are looking SE at each other’). This was the only time in both experiments that a child produced a reciprocal verb with a complement (cf. non-target answers for true reflexive verbs in Section 5.2.3.1.). The children did not provide any answer on six occasions in the youngest group.

Category	Three-year-olds	Four-year-olds	Five-year-olds	Total:
Non-target verbs Example	32 *dogovaraju se* make a deal.3pl.pres SE 'they are making a deal' instead of *gledaju se* 'they are looking at each other'	11 *jurcaju* run around.3pl.pres 'they are running around' instead of *jure se* 'they are chasing each other'	7 *igraju se tuče jastuka* play.3pl.pres SE fight.gen pillows.gen 'they are playing pillow fight' instead of *gađaju se* 'they are throwing something at each other'	50
Transitive verbs Example	7 *gledaju jedan u drugog/jedno u drugo* look.3pl.pres one at another 'they are looking at each other' instead of *gledaju se* 'they are looking at each other'	3 *on gleda nju* he.nom look.3sg.pres her.acc *ona gleda njega* she.nom look.3sg.pres him.acc 'he is looking at her she is looking at him' instead of *gledaju se* 'they are looking at each other'	2 *gledaju jedan drugog/jedno u drugog* look.3pl.pres one at another 'they are looking at each other' instead of *gledaju se* 'they are looking at each other'	12
Target verbs without the clitic *se*	/	/	/	0
Made-up verbs Example	2 *se zaljubljaju*[19] SE fall in love.3pl.pres instead of *ljube se* 'they are kissing each other'	/	1 *se bacaju jastucima* SE throw.3pl.pres pillows.inst instead of *gađaju se* 'they are throwing something at each other'	3
Nouns	/	/	/	0
Other Example	/	1 *gledaju se jedno drugo* look.3pl.pres SE one another 'they are looking SE at each other' instead of *gledaju se* 'they are looking at each other'	/	1
No answer	6	/	/	6
Total number of non target answers:	47	15	10	72

Table 44 – Non-target answers for true reciprocal verbs across groups

[19] This verb form is incorrect. The correct 3rd person plural form of the verb *zaljubiti se* 'fall in love' would be *zaljube se*.

Since the answers belonging to the non-target verbs category were by far the most numerous in the follow-up experiment as well, they were again further analysed. As it can be seen in Table 45, the syntactic complexity of non-target verbs varied. In half of the cases, the participants would replace the target true reciprocal verb with a 3rd person plural form of an unergative or transitive verb. The unergative verb *trče* 'they are running' was often used instead of the target *jure se* 'they are chasing each other', as was the case in the first experiment. The most frequent non-target answer for the target *gađaju se* 'they are throwing (pillows) at each other' was again the transitive verb *bacaju* 'they are throwing', which was sometimes used with and sometimes without a complement. Moreover, the verb *igrati se* 'play' was again the most frequently used lexical reflexive verb, which was used as a response for the target verbs *gađaju se* 'they are throwing something at each other' and *jure se* 'they are chasing each other'.

However, the participants did not produce only syntactically simpler answers. Seven instances of different true reciprocal verbs were noted in the group of three-year-olds, three more in the group of four-year-olds, and another one in the group of five-year-olds. These could not be coded as 'target' due a difference in meaning, as was the case with *oni se grle* 'they are hugging each other', which was used instead of *gledaju se* 'they are looking at each other' or *tuku se sa jastucima* 'they are fighting with pillows' instead of *gađaju se* 'they are throwing something at each other'. Only one lexical reciprocal verb was used in the youngest group (e.g. *dogovaraju se* 'they are making a deal' instead of *gledaju se* 'they are looking at each other'). See Appendix 10b for more details.

Verb type	Three-year-olds	Four-year-olds	Five-year-olds	Total (out of 50)
Unergative and transitive	21	2	/	23
Lexical reflexive and unaccusative	3	6	6	15
True reciprocal	7	3	1	11
Lexical reciprocal	1	/	/	1

Table 45 – Syntactic complexity of non-target verbs used instead of true reciprocal verbs

5.2.3.4. Lexical reciprocal verbs

The number of non-target answers for lexical reciprocal verbs in the youngest group was reduced by a third in comparison with the first experiment (61 versus 91). It was more than twice as low both in the group of four-year-olds (16 versus 37) and in the group of five-year-olds (11 versus 23). As shown in Table 46, the number of answers belonging to the category of non-target verbs was again the highest, constituting around 85% of the total number of non-target answers (75/88). Non-target verbs amounted to around 40% of the total number of answers given for lexical reciprocal verbs in the group of three-year-olds (50/120). Their number was around 10% of the total number of answers in the other two groups (14 in the group of four-year-olds and 11 in the group of five-year-olds).

There were no clitic omissions in the follow-up experiment. There were three made-up verbs (two in the group of three-year-olds and one in the group of four-year-olds). The incorrect reciprocal use of the verb *bacati* ‘throw’ was noted again. It was used instead of the verb *dobacivati se* ‘throw a ball at each other’. Three nouns were produced in the youngest tested group instead of the verb *rukuju se* ‘they are shaking hands’. There was only one answer categorised as ‘other’ in the group of four-year-olds. It included an adverb accompanied by an imitation of the activity presented in the stimulus. The children did not give any answer six times in the youngest group. All the answers are given in Appendix 10c.

Category	Three-year-olds	Four-year-olds	Five-year-olds	Total:
Non-target verbs Example	50 *mačevima se tuku* sword.inst SE fight.3pl.pres 'they are fighting with swords' instead of *mačuju se* 'they are fencing'	14 *pozdravljaju se* say hello.3pl.pres SE 'they are saying hello to each other' instead of *rukuju se* 'they are shaking hands'	11 *otimaju se* fight over.3pl.pres SE 'they are fighting over' instead of *svađaju se* 'they are arguing'	75
Transitive verbs	/	/	/	0
Target verbs without the clitic *se*	/	/	/	0
Made-up verbs Example	2 *bacaju se sa dvoje* throw.3pl.pres SE with two 'they are throwing themselves with two' instead of *dobacuju se* 'they are throwing a ball at each other'	1 *bacaju se sa loptom* throw.3pl.pres SE with ball.inst 'they are throwing themselves with the ball' instead of *dobacuju se* 'they are throwing a ball at each other'	/	3
Nouns Example	3 *zdravo/pozdrav* 'hello' instead of *rukovati se* 'shake hands'	/	/	3
Other Example	/	1 *sa rukom rade ovako* with hand.inst do.3pl.pres like this.adv 'they do like this with their hand' instead of *rukuju se* 'they are shaking hands'	/	1
No answer	6	/	/	6
Total number of non target answers:	61	16	11	88

Table 46 – Non-target answers for lexical reciprocal verbs across groups

Since the answers belonging to other categories were minor, a more detailed qualitative analysis of the types of non-target verbs was only conducted. The results are given in Table 47. In comparison with the results from the first experiment, there were more true reciprocal verbs used instead of the lexical ones, and their number was almost the same as the number of unergative and transitive verbs. As in the first experiment, the most common answer for the target verb *svađaju se* 'they are arguing' in the youngest group was the unergative verb *viču* 'they are yelling'. Interestingly, different lexical reciprocal verbs were used instead of this target verb in the two older groups (e.g. *otimaju se* 'they are fighting over it'). The verb that the children produced instead of the target *trkaju se* 'they are racing' in most of the cases was the unergative verb *trče* 'they are running', and the verbs that were used instead of the target *dobacuju se* 'they are throwing a ball at each other' were the transitive verbs *bacaju loptu* 'they are throwing a ball' or *igraju *loptu* 'they are playing ball'.

With the three remaining target lexical reciprocal verbs, true reciprocal verbs were the most common replacement. The most frequent non-target verb used instead of the target verbs *mačuju se* 'they are fencing' and *sudarili su se* 'they collided' was the true reciprocal verb *tuku se/udaraju se* 'they are fighting/hitting each other'. Likewise, the most frequent verb used instead of the target verb *rukuju se* 'they are shaking hands' was the true reciprocal verb *pozdravljaju se* 'they are saying hello to each other'. Two different lexical reciprocal verbs were given as answers for the target verb *rukuju se* 'they are shaking hands' as well (e.g. *pomire se* 'they make up').

The lexical reflexive verb *ljute se* 'they are angry' reappeared in the follow-up experiment instead of the target *svađaju se* 'they are arguing', *mačuju se* 'they are fencing', and even *sudarili su se* 'they collided' in one case. The verb *igraju se* 'they are playing' was produced as a

response to the stimuli used to elicit the verbs *mačuju se* 'they are fencing' and *dobacuju se* 'they are throwing a ball at each other' in the follow-up experiment as well.

Verb type	Three-year-olds	Four-year-olds	Five-year-olds	Total (out of 75)
Unergative and transitive	23	7	3	33
True reciprocal	17	6	6	29
Lexical reflexive and unaccusative	7	/	/	7
Lexical reciprocal	3	1	2	6

Table 47 – Syntactic complexity of non-target verbs used instead of lexical reciprocal verbs

5.2.3.5. Anti-causative verbs

As it can be seen in Table 48, there were 33 non-target answers in the group of three-year-olds, 18 non-target answers in the group of four-year-olds and 13 non-target answers in the group of five-year-olds, which makes a total of 64 non-target answers. Therefore, the total number of non-target answers was more than twice as low as the number of non-target answers in the first experiment (140). Another important difference in comparison with the results from nine months earlier was that non-target answers were only found in four different categories (non-target verbs, transitive variants of *se*-verbs, made-up verbs, and other). There were no clitic omissions, nouns used instead of verbs, or cases when the children did not give any answer. The answers belonging to the category of non-target anti-causative verbs were still the most numerous, constituting 55% of the total number of non-target answers (35/64).

Non-target verbs were most numerous in the group of three-year-olds, and they make up 18% of all the children's answers for anti-causative verbs (22/120). There were 6 transitive variants of the target verbs used, as had been the case in the first experiment. There were two instances of a made-up verb, which had already been noted in the first experiment (*oduvala se* 'it blew out'

instead of *ugasila se* ‘it went out’). The answers in the category ‘other’, in which the participants answered with copular constructions or only adjectives, were not numerous anymore (3).

The number of non-target answers decreased across groups. In the group of four-year-olds, there were 8 non-target verbs and 10 answers categorized as ‘other’. In the oldest tested group, there were 5 non-target verbs, one transitive variant of the verb, two examples of a made-up verb, and 5 answers categorized as ‘other’. All the answers are given in Appendix 10d.

Category	Three-year-olds	Four-year-olds	Five-year-olds	Total:
Non-target verbs Example	22 *on se raspao* he.nom SE fall apart.3sg.masc 'it fell apart' instead of *pokvario se* 'it stopped working'	8 *sija* glow.3sg.pres 'it glows' instead of *upalilo se* 'it turned on'	5 *se isključila* turn off.3sg.fem SE 'it turned off' instead of *ugasila se* 'it went out'	35
Transitive verbs Example	6 *onda je došao vuk i upalio svetlo* then.adv come.3sg.past wolf.nom and turn on.3sg.past light 'then came the wolf and turned on the light' instead of *upalilo se* 'it turned on'	/	1 *ugasio je neko* extinguish.3sg.masc.past someone.nom 'someone extinguished it' instead of *ugasila se* 'it went out'	7
Target verbs without the clitic se	/	/	/	0
Made-up verbs Example	2 *oduvala* se blow out.3sg.fem SE 'it blew out' instead of *ugasiti se* 'go out'	/	2 *oduvala* se blow out.3sg.fem SE 'it blew out' instead of *ugasiti se* 'go out'	4
Nouns	/	/	/	0
Other Example	3 *otvorena je* open.fem.adj is 'it is opened' instead of *otvorila se* 'it opened'	10 *upaljeno* (2x) turned on.neut.adj 'turned on' instead of *upalilo se* 'it turned on'	5 *robot je pokvaren* robot.nom is broken 'the robot is broken' instead of *pokvario se* 'it stopped working'	18
No answer	/	/	/	0
Total number of non target answers:	33	18	13	64

Table 48 – Non-target answers for anti-causative verbs across groups

After a nine-month period, non-target verbs were still produced for every tested verb in the youngest group. However, the distribution of different types of verbs that were used instead of the target anti-causative verbs differed considerably from those noted in the first experiment, as shown in Table 49. The number of agentive non-target verbs decreased in comparison with the first experiment. Only 25% of the non-target verbs produced in the youngest group included the presence of an Agent (compared to 40% in the first experiment). The number of unaccusative verbs also decreased in comparison to the one produced in the first experiment; 20% of the non-target verbs were unaccusative. All the remaining verbs that were produced were non-target anti-causative verbs. Therefore, more than 50% of the non-target verbs were verbs of the same syntactic complexity. In most cases, they were semantically inappropriate for the given situation (e.g. *onda se sve pocepalo* 'then it all tore' instead of *vaza se polomila* 'the vase broke'). *Pokvariti se* 'stop working' was the most common non-target verb, which was produced in response to stimuli testing different anti-causative verbs. The number of non-target verbs was the highest for the verb *ugasiti se* 'go out'. The children produced different non-target anti-causative verbs instead: *istopila se* 'it melted'; *pokvarila se* 'it stopped working'; *isključio se* 'it turned off'. As it can be seen from Table 49, the number of all the verb types decreased in the two older groups.

Verb type	Three-year-olds	Four-year-olds	Five-year-olds	Total (out of 39)
Verbs with Agents	6	2	2	10
Unaccusative verbs	5	3	2	10
Anti-causative verbs	13	3	3	19

Table 49 – Syntactic complexity of non-target verbs used instead of lexical reciprocal verbs

6. GENERAL DISCUSSION

6.1. Observed tendencies in the production of *se*-verbs

The results of the pilot research showed that both true and lexical reflexive verbs were produced significantly better than true reciprocal and anti-causative verbs in the youngest group tested. In the group of four-year-olds, both true and lexical reflexive verbs were produced more accurately than anti-causative verbs (although the differences were only marginal), whereas in the group of five-year-olds, true reflexive verbs were produced with greater success than true reciprocal verbs (the difference was only marginal again). Another finding worth mentioning was that in the group of five-year-olds, the difference between the production of true reciprocal and anti-causative verbs was significant, in favour of true reciprocal verbs, which might suggest that anti-causative verbs remain the most difficult type to produce at later stages of language acquisition.

The statistical analyses of the increase in the production of individual verb types in different age groups rendered two important findings: there were no significant differences in the production of lexical reflexive verbs between any of the tested age groups; on the other hand, differences in the production of anti-causative verbs were found between all the tested age groups. Based on these findings, an assumption was made that lexical reflexive verbs could be the first, and anti-causative verbs the last type of *se*-verbs to be acquired.

The sample in the pilot research was rather small, but it was enough to observe the basic tendencies in the production of *se*-verbs. The results supported the initial hypothesis that reflexive verbs are acquired before reciprocal and anti-causative verbs, and we expected more prominent differences to appear in the main experiment, with the increase in the number of participants and a more evenly distributed age range.

The results of the first experiment in the main research confirmed the initial hypothesis. As shown in Figure 27, both true and lexical reflexive verbs were produced significantly better

than true reciprocal and anti-causative verbs in the groups of three-year-olds and four-year-olds. In the group of five-year-olds, differences were found between the production of lexical reflexive verbs and true reciprocal verbs, as well as between lexical reflexive verbs and anti-causative verbs. Lexical reflexive verbs were produced significantly better than true reciprocal and anti-causative verbs, which was no longer the case with true reflexive verbs. Lexical reflexive verbs were also produced significantly better than true reflexive verbs at this age, whereas there was only a marginal difference in the production of the two verb types found in the youngest tested group.

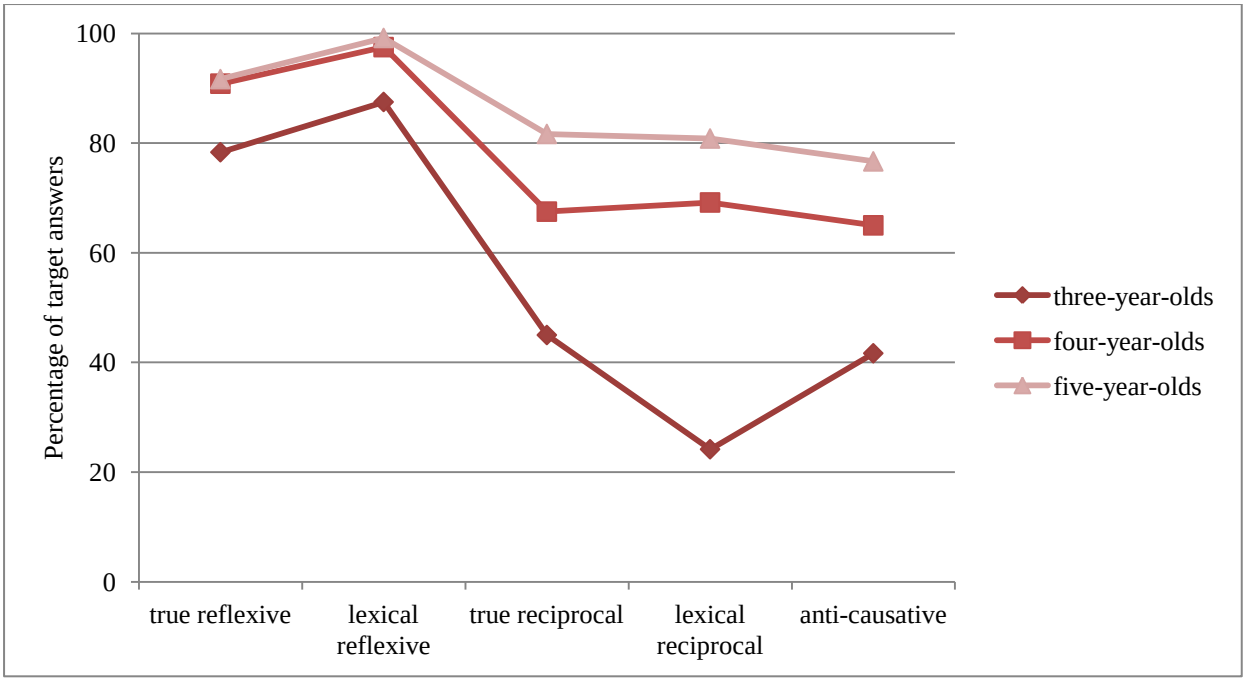


Figure 27 – Percentage of target answers per verb type across groups

Interestingly, one finding from the pilot study regarding the group of five-year-olds was replicated. Namely, it was shown that true reciprocal verbs were produced significantly better than anti-causative verbs at the age of five, which was not the case in the two younger groups. Both verb length and frequency effects were significant in this age group as well, although they did not prove to be stable effects. This could imply that, while both of these types of *se*-verbs are difficult for children at younger ages (when only the verb length seems

to play an important role as a covariable in verb production), anti-causative verbs remain difficult for a longer period within first language acquisition.

The second part of statistical analyses confirmed some of the findings from the pilot research and gave very interesting results. Namely, no differences in the production of true reflexive verbs and lexical reflexive verbs between the ages of 4 and 5 were found, which could suggest that the age when these verb types are fully acquired is around four. On the other hand, the differences in the production of true reciprocal verbs, lexical reciprocal verbs and anti-causative verbs were found between all the ages tested, which suggests that the acquisition of these three verb types is delayed in comparison with true and lexical reflexive verbs. It is important to note that a frequency effect was found only with true and lexical reciprocal verbs, which indicates that the frequency of true and lexical reciprocal verbs was a contributing factor to the success in the production of these verbs in the present study, which did not seem to be the case with other verb types. In other words, verb frequency determined which of the true and lexical reciprocal verbs tested would be produced successfully. That explains why certain true reciprocal verbs such as *ljube se* 'they are kissing each other' were produced successfully even in the youngest tested group, whereas other verbs with a lower frequency were not. Although we attempted to find verbs of almost equal frequency, it was impossible to find such verbs that could be easily presented in the stimuli at the same time. On the other hand, the effect of verb length was found with all the verb types (although it was marginal in the case of lexical reflexive verbs), except with anti-causative verbs. It is important to stress that neither the frequency effect nor the effect of verb length were found with anti-causative verbs, which suggests that the difficulty that the participants had with this verb type must come from their complexity in terms of theta-role mapping.

The results of the follow-up experiment showed that lexicality no longer played an important role in the production of true reflexive verbs and lexical reflexive verbs, which provided a

complete answer to the second research question. No differences were found between the production of these two verb types after a nine-month period in any of the tested age groups. In the youngest group tested, lexical reflexive verbs were still produced better than either true reciprocal or anti-causative verbs. There were no other significant differences found in this or the two older groups.

However, the second part of the statistical analyses yielded interesting results. Whereas it was shown that there were no differences in the production of true reflexive verbs or lexical reflexive verbs between any of the tested ages (which confirmed our previous conclusion that these two verb types are fully acquired around the age of four), differences in the production of the remaining three verb types were still found. The effect of verb length was found with true and lexical reflexive verbs, as well as true reciprocal verbs. Interestingly, the effect of frequency was only found with true reciprocal verbs. True reciprocal verbs were produced significantly better by both five-year-olds and four-year-olds than by three-year-olds. However, no difference in the production was found between four-year-olds and five-year-olds after a nine-month period, which suggests that this verb type is fully acquired around the age of five. The results were exactly the same for the production of lexical reciprocal verbs and anti-causative verbs. Overall, the results obtained from the statistical analyses of the production per verb type strongly suggest that true and lexical reflexive verbs are acquired before true reciprocal, lexical reciprocal, and anti-causative verbs, which provided a thorough answer to the first research question regarding the order of the acquisition of Serbian *se*-verbs.

It is important to comment on the individual *se*-verbs that have been shown to be the easiest and most difficult to produce. *Kupati se* 'bathe' proved to be the easiest true reflexive verb to produce, since the production of this verb reached 100% in all the tested groups in both experiments. The production was equally successful for the lexical reflexive verbs *ljuljati se*

'swing' and *spuštati se* 'slide'. These could be among the first *se*-verbs that children acquire. In the group of true reciprocal verbs, the verb *grliti se* 'hug each other' was produced successfully even in the youngest group tested (90% of children produced it correctly). Moreover, the verbs *ljubiti se* 'kiss each other' and *tući se* 'fight with each other' were produced quite successfully as well. These are the verbs that Berman (1985) calls "most typically reciprocal" and predicts to be acquired before other reciprocal verbs. On the other hand, the verb *juriti se* 'chase each other' proved difficult to produce, even in the oldest group in the first experiment (only 40% of the children produced it correctly in the group of five-year-olds). The reason for this was not only that many children used the unergative verb *trčati* 'run' instead, but also that children used decomposed predicates as well (*igraju jurke/vije* 'they are playing chasing/tag'). In the group of lexical reciprocal verbs, the discrepancy between easy and difficult verbs was not so great, i.e. all of the verbs proved to be quite difficult to produce. The verb *rukovati se* 'shake hands' had the lowest production in both the first and the follow-up experiment. The verb *mačevati se/boriti se* 'fence/fight' reached maximum production in the group of five-year-olds in the first experiment and in the groups of four-year-olds and five-year-olds in the follow-up experiment.

Finally, the production of all anti-causative verbs in the group of three-year-olds was between 30% and 45%, except for the verb *pokvariti se* 'stop working' (60%), which could indicate that this verb is the most lexicalised one among the tested anti-causative verbs. This verb also appeared as a non-target answer for other target anti-causative verbs tested. The verb *ugasiti se* 'go out' remained the most difficult to produce even in the oldest group in the follow-up experiment (55%), most likely due to the children's real-world bias, i.e. their interpretation of what would happen in the given situation.

6.2. Implications for the theory

After analysing the children's non-target answers for true reflexive verbs, it can be concluded that the distribution of the clitic *se* and the reflexive pronoun s*ebe* 'self' in the production of reflexive *se*-verbs is not the same. This finding supports the results of using different tests to prove different syntactic manifestations of the two forms (Moskovljević, 1997; Medová, 2009; Oraić Rabušić, 2015; for more details see Section 2.1.1). It is important to mention that the use of the reflexive pronoun *sebe* 'self' was noted only once in the whole research (in the follow-up experiment). In all other cases, if the participants used transitive verbs instead of reflexive ones, their complements would be noun phrases in the accusative case, rather than the reflexive pronoun.

Moreover, the children did not combine reflexive verbs with direct objects. This happened only once, in the follow-up experiment (*pa se onda češljala kosu* 'so SE then she combed hair'), and can therefore be taken as a lapse, rather than as evidence of lack of their sensitivity to reflexivity. One of the most important findings of the present research is that children are sensitive to the difference between transitive and reflexive verb forms from the earliest tested age, which supports the results of previous research in favour of the Continuity Hypothesis (Snyder et al., 1995; Snyder–Hyams, 2015). Reciprocal verbs were not combined with direct objects either. As was the case with reflexive verbs, the combination of a reciprocal verb with the complement *jedan drugog* 'each other' happened only once, in the follow-up experiment (*gledaju se jedno drugo* 'they are looking SE at each other').

The children's non-target answers for true reflexive verbs speak of their tendency to use transitive verbs, which show canonical linking of semantic roles and syntactic functions (Pinker, 1984, 1989). The possibility of using verbs with complements instead of *se*-verbs explains the somewhat lower production of true reflexive verbs in comparison with lexical reflexive verbs, which do not have transitive paraphrases in the experimental context.

Lexicality proved to be an important factor in the production of true and lexical reflexive verbs. The difference between the production of true reflexive verbs and lexical reflexive verbs proved to be significant in the group of five-year-olds. It was not significant in the group of four-year-olds, while it was only marginally significant in the group of three-year-olds. This is an interesting finding since it shows that two verb types that are similar and appear to be the same on the surface, are not produced with equal success. The reason why the difference was significant in the oldest tested group could be that children still tend to combine verbs with complements instead of using reflexive forms when possible as they get older. However, there were no differences between the two verb types found in the follow-up experiment.

An important developmental milestone was noticed in the production of true reciprocal verbs at a young age. Namely, the correct 3rd person plural present form was replaced by the 3rd person singular form in many cases in the youngest group tested, both in the pilot research and in the main research (in the first experiment), supporting the claim that the 3rd person singular verb is the default verb form in child speech in Serbian (Mandić, 2013).

The difference between the production of true reciprocal and lexical reciprocal verbs was not significant at any of the tested ages. However, clitic omissions happened more frequently with true reciprocal verbs (9) than with lexical reciprocal verbs (2) in the first experiment. There were no clitic omissions in the follow-up experiment. Using transitive verbs instead of true reciprocal verbs was not nearly as frequent as using transitive verbs instead of true reflexive verbs. Using transitive verbs with the complement *jedan drugog* 'each other' was only noted three times in the oldest group in the first experiment, whereas verbs taking a single agent and patient were noted in the younger groups (e.g. *brat gleda u seku a seka gleda u brata* 'the brother is looking at his sister and the sister is looking at her brother'). In the follow-up experiment, transitive verbs occurred as a non-target answer more frequently.

Moreover, transitive verbs with the complement *jedan drugog* 'each other' were noted in every group (five times in total). This implies that children start actively using the reciprocal construction with the complement much later than they start producing true reciprocal verbs, which is in line with Berman's (1985) description of the three stages of verb acquisition (see Section 2.3).

As far as non-target answers for true reciprocal verbs are concerned, those belonging to the category of non-target verbs were the most numerous. Most frequently, the children would replace target true reciprocal verbs with unergative or transitive verbs. The activities denoted by those verbs are performed by two agents, rather than simultaneous agents and patients, which points to the similarity between these verb types. This finding is in line with the definition of reciprocal verbs provided in Section 2.1.2, according to which reciprocal verbs behave like unergative verbs, with their second argument acting as "a secondary agent" (Rákosi, 2008).

The situation was similar with non-target answers for lexical reciprocal verbs. There were even more unergative and transitive verbs that were used instead of target lexical reciprocal ones, which supports Miličević's (2015) claim that inherent reciprocal verbs are closer to unergative verbs than to reciprocal verbs.

Made-up verbs are another important aspect of the children's non-target answers since they testify to the children's readiness to experiment with verbs. Examples of made-up verbs were found with true reciprocal, lexical reciprocal, and anti-causative verbs in the main research. The participants produced forms that they had never heard before, which speaks against strict lexical conservatism (in line with Pinker, 1989). They would insert the clitic *se* in order to make a certain verb reciprocal when they could not recall the target verb, even though they could not have heard it in adult language (e.g. *bacati se* 'throw oneself' instead of *dobacivati se* 'throw a ball at each other'). Thus, they applied a morphological rule they had acquired,

which resulted in making a mistake related to narrow semantic constraints the children had not completely acquired yet. One could argue that the children were induced to apply this generalization in the experimental context. However, that is unlikely, since the clitic *se* was never used with filler stimuli, or with unergative and transitive verbs that were used as non-target answers, which supports the idea that certain errors are never made by children (Kuczaj–Maratsos, 1979; Pinker, 1984, 1989).

By simply looking at the number of non-target answers for anti-causative verbs produced in the first experiment, one could easily say that the results speak in favour of the Maturation Hypothesis, which predicts difficulty with anti-causative verbs due to the children's inability to form A-chains (Borer–Wexler, 1987; Miyamoto et al., 1999; Babyonyshev et al., 2001; Lee–Wexler, 2001; Ito–Wexler, 2002). However, in order to interpret the obtained results in the most accurate way, children's non-target answers need to be carefully looked at. From what was presented in Section 4.5.3.5, it can be concluded that children produce a considerable number of anti-causative verbs at an early age. However, these verbs could not be coded as 'target', because they were either semantically inappropriate or they were made-up (*oduvalo se* 'it blew out SE'). Made-up verbs that were used instead of target anti-causative verbs are yet another piece of evidence of the children's morpho-syntactic productivity and their innate knowledge of semantic roles. They also point to the children's difficulty with subtle nuances in verb meaning, i.e. narrow constraints (Pinker, 1989). In the above-mentioned example, the child applied the process of turning a transitive verb into an anti-causative one. However, the child had not yet learnt that the verb *oduvati* 'blow out' cannot be detransitivised, because it requires the presence of an Agent. Therefore, the author believes 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. The obtained results are

thus in line with Snyder–Hyams's (2015) predictions about the success in early production of anti-causative verbs, or FRCCs, as they named them.

Finally, the second most numerous category of non-target answers for anti-causative verbs – copular constructions, can be explained by the conceptual difficulty between being in and entering into a state, as was suggested by Berman (1985).

6.3. Limitations of the research

One of the dangers of conducting longitudinal studies is selective attrition, i.e. participants might drop out for various reasons (Jerković–Zotović, 2015). In the present research, only one girl dropped out of the study, because she moved away from the area. She was replaced with another girl matched in age in order to maintain a uniform number of participants across the age groups. Although it might be the case that the language development of the two girls was at different stages, the inclusion/exclusion of that participant from the data set in the final statistical analysis did not change the structure of results.

Another limitation of the research was that 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). This 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 the Serbian Web Corpus (srWaC). As mentioned before, verbs perfectly matched in frequency that would suit the needs of the present research could not be found, which resulted in finding the frequency effect with some of the tested verb types.

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 the 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.

6.4. Suggestions for further research

Firstly, the number of participants should be enlarged in the future so as to confirm the observed tendencies. It is possible that the effect of covariables wouldn’t be found in a larger sample. Moreover, it is necessary to include data from children younger than 3 in order to check their production of anti-causative verbs. This would have further implications for completely rejecting the Maturation Hypothesis, as the results of the present thesis have suggested. The Serbian Electronic Corpus of Children’s Early Language (Anđelković–Ševa, & Moskovljević, 2001) provides an adequate direction for future research in this respect, as well as regarding the first appearance of morpho-syntactically derived and lexical forms of reflexive and reciprocal verbs (as discussed in Section 4.6.1.4).

In the present research, interviews with adult speakers of Serbian were informally conducted, and their production was flawless. However, it is questionable whether adults are a suitable control group in experimental research with children since their perception of reality is different. A group of primary school children could be tested as a control group in the future, although the oldest group tested could be treated as a control group in its own right, since

five-year-olds showed virtually faultless performance in the follow-up experiment (with the lowest production of anti-causatives reaching 89% and all other verb types exceeding 90%). Finally, in the future, different target verbs belonging to the tested verb types should be tested so as to rule out the possibility that some of the verbs were particularly hard for the children. In the present research, we aimed at choosing and presenting concrete activities and events commonly occurring within a household, which are not too abstract for children. Some of the tested verbs were still less concrete than others (e.g. *češljati se* 'comb oneself' vs. *gledati se* 'look at each other'). Furthermore, if the five verb types are compared with respect to their level of abstractness, anti-causative verbs seem to be the most abstract type, and this should be borne in mind in future research.

7. CONCLUSION

The aim of the present research study was to test the production of true reflexive, lexical reflexive, true reciprocal, lexical reciprocal, 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 and semantic complexity. Some important developmental changes were noted. Based on the data obtained in the three age groups at two different points in time, the developmental pattern of Serbian *se*-verbs would be: lexical reflexive > true reflexive > true reciprocal, lexical reciprocal, and anti-causative verbs. Whereas frequency proved to play an important role in determining which true and lexical reciprocal verbs would be produced successfully, it was not significant in the production of anti-causative verbs. The initial hypothesis that reflexive verbs are acquired before reciprocal and anti-causative verbs because they are the least complex among the tested *se*-verbs, was confirmed. 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.

One of the major findings of this study is that children do not seem to have problems 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 et al., 1995; Lorusso et al., 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 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, the author believes 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 conclusive enough to completely reject the Maturation hypothesis at this point, since the youngest child tested was 31 months old and the relatively "old" age of the participants might account for their ability to perform A-movement. Further data from younger participants is needed in order to confirm these results in the future.

Examples of the children's made-up verbs speak in favour of the children's inability to assign verbs to the narrow semantic categories to which they belong. This finding provides support for Pinker's hypothesis on narrow semantic constraints, which was confirmed in the experiment conducted by Brooks–Tomasello (1999). The results also show that children are likely to overgeneralize implicit Agents with anti-causative verbs, as previous studies have suggested (Roeper, 1987; Bowerman, 1991; Verrips, 2000; Ilić, 2015).

Regarding the conclusions reached about the clitic *se*, the present results speak in favour of different distribution of the clitic *se* and the reflexive pronoun *sebe* 'self' in the production of true reflexive *se*-verbs. Importantly, the use of the reflexive pronoun *sebe* 'self' was noted only once in the whole research. Therefore, the clitic *se* should rather be treated as a morpheme than as the shortened form of the reflexive pronoun, which is in line with some previous findings (Ivić, 1961–1962; Piper, Antonić et al., 2005; Arsenijević, 2011; Reinhart–Siloni, 2003). The present research also provides evidence in favour of an intransitive analysis of *se*-verbs since it was shown that children do not combine *se*-verbs with direct objects in the process of first language acquisition. This is in line with some conclusions of

cross-linguistic research (Grimshaw, 1982; Alsina, 1996; Patejuk–Przepiórkowski, 2015; Reinhart–Siloni, 2003, among others),[20] as well as Serbian-specific research on reflexive verbs (Moskovljević, 1997; Marelj, 2004; Samardžić, 2006, Arsenijević, 2011 among others). The results of this thesis also provide support for the claim that reciprocal verbs possess more agentive properties than reflexive verbs (Rákosi, 2008; Siloni, 2008; Miličević, 2015), taking into account the children's non-target answers for reciprocal verbs that were frequently unergative and transitive verbs with co-agents rather than simultaneous agents and patients. Lastly, the present research indicates that children acquire multiple functions of the morpheme *se* quite early in the process of language acquisition. They do not only start producing the morphological marker of intransitivity with various types of *se*-verbs at early stages of language acquisition, but they also apply it to made-up verbs.

In conclusion, the obtained data suggest that the complexity of verbs with the clitic *se* in Serbian varies syntactically and semantically, and provide possible venues for redefining the lexical-syntactic status of the clitic *se* in the future.

[20] For a recent view of the contrary, see De Alencar–Kelling (2005).

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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 to 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

By 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: Sample interview

Šta radi ovaj bata, on ovde stoji, a ovde?

What do.3sg.pres this.nom boy.nom he.nom here.adv stand.3sg.pres and here.adv

'What is this boy doing, he is standing here, and here?'

Trči.

run.3sg.pres

'He is running.'

Šta je bilo sa ovom vazom?

what is be.neut.perf with this vase.inst

'What happened to this vase?'

Razbila se.

break.3sg.fem SE

'It broke.'

Šta radi bata?

What do.3sg.pres boy.nom

'What is the boy doing?'

Spušta se.

slide.3sg.pres SE

'He is sliding.'

A seka?

and girl.nom

'And the girl?'

Ljulja se.

swing.3sg.pres SE

‘She is swinging.’

Oni ovde crtaju, a šta rade ovde, vidi?

they.nom here.adv draw.3pl.pres and what do.3pl.pres here.adv look.2sg.imp

‘They are drawing here, and what are they doing here, look?’

Razgovaraju.

talk.3pl.pres

‘They are talking.’

I? Vidi, šta mi sad radimo?

And look.2sg.imp what we.nom now.adv do.1pl.pres

‘And? Look, what are we doing now?’

Gledamo.

look.1pl.pres

‘We are looking.’

Šta oni sad rade?

What they.nom now.adv do.3pl.pres

‘What are they doing now?’

Gledaju.

look.3pl.pres

‘They are looking.’

Gledaju, koga?

look.3pl.pres whom

‘Who are they looking at?’

On gleda nju, ona gleda njega.

he.nom look.3sg.pres her she.nom look.3sg.pres him

‘He is looking at her and she is looking at him.’

Dobro. Hajde da vidimo, šta mama radi?

okay let’s to see.1pl.pres what mum.nom do.3sg.pres

‘Okay. Let’s see, what is mum doing?’

Gleda se u ogledalo, stavlja karmin.

look.3sg.pres SE in mirror.acc put on.3sg.pres lipstick.acc

‘She is looking at herself in the mirror, putting on lipstick.’

Kako to još može da se kaže, ako stavlja i karmin?

How that else can.3sg.pres to SE say.3sg.pres if put on.3sg.pres and lipstick.acc

‘How else can you say that, if she is putting on lipstick?’

Šminka se.

put on make-up.3sg.pres

‘She is putting on make-up.’

Super! Oni ovde voze autiće, i šta se ovde desilo?

great they.nom here.adv drive.3pl.pres cars.acc and what SE here.adv happen.3sg.neut

‘Great! They are driving cars here, and what happened here?’

Sudarili su se.

collide.3pl.masc SE

‘They collided.’

On ovde stoji, a šta radi ovde?

he.nom here.adv stand.3sg.pres and what do.3sg.pres here.adv

‘He is standing here and what is he doing here?’

Vozi.

drive.3sg.pres

‘He is driving.’

Dobro, ovde plače a ovde, ha ha?

okay here.adv cry.3sg.pres and here.adv ha ha.onomatopoeia

‘Okay, he is crying here and here, haha?’

Smeje se.

laugh.3sg.pres

‘He is laughing.’

Dobro. Oni ovde sede, a šta rade ovde u sobi sa jastucima?

Okay they.nom here.adv sit.3pl.pres and what do.3pl.pres here.adv in room.loc with pillows.inst

‘Okay. They are sitting here, and what are they doing with pillows here in the room?’

Gađaju se.

throw.3pl.pres SE

‘They are throwing pillows at each other.’

Ovde seka šta radi?

here.adv girl.nom what do.3sg.pres

‘What is the girl doing here?’

Češlja se.

comb.3sg.pres SE

‘She is combing herself.’

Oni igraju fudbal, a šta devojčice rade?

they.nom play.3pl.pres football.acc and what girls.nom do.3pl.pres

‘They are playing football and what are the girls doing?’

Dobacuju se.

throw a ball.3pl.pres SE

‘They are throwing a ball at each other.’

Šta je bilo sa ovim robotom?

What is be.3sg.neut with this robot.inst

‘What happened to this robot?’

Pokvaren je.

broken.masc is

‘It is broken.’

Znači, šta mu se desilo?

so what he.dat SE happen.3sg.neut

‘So, what happened to it?’

Ovde radi, a ovde?

here.adv work.3sg.pres and here.adv

‘Here it’s working, and here?’

Ne radi.

not work.3sg.pres

‘It isn’t working.’

Nego?

‘Because?’

... **se pokvario.**

SE stop working.3sg.masc

'It stopped working.'

Bravo. Šta je bilo sa balonom?

bravo what is be.3sg.neut with balloon.inst

'Bravo. What happened to the ballon?'

Pukao je.

pop.masc.past is

'It popped.'

Ovde deca stoje, a šta rade napolju, on kaže uhvatiću vas, a ostali beže?

here.adv children.nom stand.3pl.pres and what do.3pl.pres outside.adv he.nom say.3sg.pres

catch.1sg.fut you.acc and rest.nom run away.3pl.pres

'The children are standing here, and what are they doing outside? He says I'll catch you and they run

away?'

Vijaju se.

chase.3pl.pres SE

'They are chasing each other.'

Bravo, tako je. Ona ovde pušta vodu, a ovde?

Bravo like that.adv is she.nom here.adv let.3sg.pres water.acc and here.adv

'Bravo, that's it. She is letting the water run here, and here?'

Kupa se.

bathe.3sg.pres SE

‘She is bathing.’

Ovde devojčice tapšu, a šta rade dečaci?

here.adv girls.nom clap.3pl.pres and what do.3pl.pres boys.nom

‘The girls are clapping here, and what are the boys doing?’

Rukuju se.

shake hands. 3pl.pres SE

‘They are shaking hands.’

Bravo! Super. Šta je bilo sa svećicom?

bravo great what is be.3sg.neut with candle.inst

‘Bravo! Great. What happened to the candle?’

Ugasila se.

go out.3sg.fem SE

‘It went out.’

Bravo. Ovde ona igra školicu, a šta balerina radi, onako u krug?

bravo here.adv she.nom play.3sg.pres hopscotch.acc and what ballerina.nom do.3sg.pres in circle.acc

‘Bravo. She is playing hopscotch here, and what is the ballerina doing, making a circle?’

Vrti se.

spin.3sg.pres

‘She is spinning.’

Ovde on sedi, a ovde?

here.adv he.nom sit.3sg.pres and here.adv

‘He is sitting here, and here?’

Jede.

eat.3sg.pres

‘He is eating.’

Ovde mama uživa, a ovde?

here.adv mum.nom enjoy.3sg.pres and here.adv

‘Mum is enjoying here, and here?’

Umiva se.

wash face.3sg.pres SE

‘She is washing her face.’

I?

‘And?’

Briše se.

dry.3sg.pres SE

‘She is drying herself.’

Super. One ovde navijaju, a šta rade dečaci?

great they.nom here.adv cheer.3pl.pres and what do.3pl.pres boys.nom

‘Great! They are cheering here, and what are the boys doing?’

Mačuju se.

fence.3pl.pres SE

‘They are fencing.’

Super. Da vidimo ovde. Šta se desilo sa svetlom?

great to see.1pl.pres here.adv what SE happen.3sg.neut with light.inst

‘Great. Let’s see this. What happened to the light?’

Ovde je upaljeno, a ovde nije.

here.adv is lit.neut and here.adv not

‘Here it is lit, and here it isn’t.’

Aha, znači ono nije bilo upaljeno, i onda šta se desilo, svetlo?

aha so that.nom not was lit.neut and then.adv what SE happen.3sg.neut light.nom

‘Aha, so it wasn’t lit and then, what happened, the light?’

...se upalilo.

se turn on.3sg.neut

‘It turned on.’

Bravo. Oni ovde trče, a šta radi ovde dečak?

bravo they.nom here.adv run.3pl.pres and what do.3sg.pres here.adv boy.nom

‘Bravo. They are running here, and what is the boy doing here?’

Penje se.

climb.3sg.pres SE

‘He is climbing. ‘

Devojčice ovde pričaju, a šta rade dečaci?

girls,nom here.adv talk.3pl.pres and what do.3pl.pres boys.nom

‘The girls are talking here, and what are the boys doing?’

Udaraju se.

fight.3pl.pres SE

‘They are fighting with each other.’

Ovde nema kolača, a ovde?

here.adv not have.3sg.pres cookies.gen and here.adv

‘There aren’t any cookies here, but here?’

Ima.

have.3sg.pres

‘There are.’

Devojčice ovde navijaju, a šta rade dečaci, ima neka staza, i cilj, i onda oni jedan protiv drugog, šta rade?

girls.nom here.adv cheer.3pl.pres and what do.3pl.pres boys.nom have.3sg.pres some track.nom and finishline.nom and then.adv they.nom one against another what do.3pl.pres

‘The girls are cheering here, and what are the boys doing? There is a track, and a finishline, and what are they doing against each other?’

Trče.

run.3pl.pres

‘They are running.’

Dobro. Da vidimo šta se desilo sa vratima. Pogledaj dobro, šta se desilo sa vratima?

okay to see.1pl.pres what SE happen.3sg.neut with door.ins look.2sg.imp well what SE happen.3sg.neut with door.inst

‘Okay. Let’s see what happened to the door. Look at it carefully, what happened to the door?’

Zatvorila su se.

SE close.3pl.fem

‘It closed there.’

Super. Da vidimo ovde ona crta, a šta radi ovde?

great to see.1pl.pres here.adv she.nom draw.3sg.pres and what do.3sg.pres here.adv

‘Great. Let’s see, here she is drawing, and here?’

Igra se.

play.3sg.pres SE

‘She is playing.’

Dobro, oni ovde sede, a ovde?

okay they.nom here.adv sit.3pl.pres and here.adv

‘Okay, here they are sitting, and here?’

se ljube...

SE kiss.3pl.pres

‘They are kissing each other.’

Ovde on pušta vodu, a ovde?

here.adv he.nom let.3sg.pres water.acc and here.adv

‘Here he is letting the water run, and here?

Umiva se.

wash face.3sg.pres SE

‘He is washing his face.’

Ovde ona jede, a ovde?

here she.nom eat.3sg.pres and here.adv

‘She is eating here, and here?’

Pije.

drink.3sg.pres

‘She is drinking.’

Šta se desilo sa kapijom ovde?

what se happen.3sg.neut with gate.inst here.adv

‘What happened to the gate here?’

Otvorila se.

open.3sg.fem SE

‘It opened.’

Ovde je jabuka na drvetu, a ovde šta je bilo?

here.adv is apple.nom on tree.loc and here.adv what is be.3sg.neut

‘There is an apple on the tree here, and what happened here?’

Pala je.

fall.3sg.past

‘It fell.’

Ovde? Šta rade dečak i devojčica?

here.adv what do.3pl.pres boy.nom and girl.nom

‘Here? What are the boy and the girl doing?’

Grle se.

hug.3pl.pres SE

‘They are hugging each other.’

Ovde bata šta radi?

here.adv boy.nom what do.3sg.pres

‘What is the boy doing here?’

Skida se.

get undressed.3sg.pres SE

‘He is getting undressed.’

A ovde?

and here.adv

‘And here?’

Ono suprotno. Ovde se skida, a ovde?

that opposite here.adv SE get undressed.3sg.pres and here.adv

‘The opposite. Here he is getting undressed and here?’

...se oblači.

SE dress.3sg.pres

‘He is dressing.’

Odlično. One ovde lepo pričaju, a dečaci, šta rade dečaci? Onaj kaže ja ću, a onaj kaže ne, ne, ja ću.

excellent they.nom here.adv nicely.adv talk.3pl.pres and boys.nom what do.3pl.pres boys.nom this.nom say.3sg.pres I.nom will.1sg.pres and that.nom say.3sg.pres no no I.nom will.1sg.pres

‘Excellent. They are talking nicely here, and the boys, what are the boys doing? This one says I will, that one says no, no, I will.’

Svađaju se.

argue.3pl.pres SE

‘They are arguing.’

Super. Bilo teško?

great be.3sg.neut hard.adv

‘Great. Was it hard?’

Appendix 3: GLMER analyses conducted in the pilot

Appendix 3a: GLMER analyses on the sample of three-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.597	.772
Stimuli : Intercept			.717	.847
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reflexive)	1.072	.849	1.263	.207
Trial Order	.028	.031	.908	.364
Verb Frequency	.122	.518	.236	.814
Verb Length	.132	.347	.382	.702
Verb Type (true reflexive)	-.553	1.048	-.528	.598

GLMER analysis of true and lexical reciprocal verb production on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.966	1.402
Stimuli : Intercept			1.768	1.330
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reciprocal)	-1.573	1.225	-1.284	.199
Trial Order	.000	.036	.022	.982
Verb Frequency	-.045	.544	-.083	.934
Verb Length	-.605	.838	-.722	.470
Verb Type (true reciprocal)	.196	1.563	.126	.900

GLMER analysis of true reciprocal and anti-causative verbs on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.672	.819
Stimuli : Intercept			.969	.984
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	-2.118	1.038	-2.039	.041*
Trial Order	.007	.032	.242	.808
Verb Frequency	-.074	.422	-.176	.860
Verb Length	-1.426	.754	-1.891	.058.
Verb Type (anti-causative)	1.268	1.461	.868	.385

Appendix 3b: GLMER analyses on the sample of four-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.474	.689
Stimuli : Intercept			1.030	1.015
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	2.474	1.012	2.445	.014*
Trial Order	-.065	.036	-1.811	.070.
Verb Frequency	-.310	.625	-.497	.618
Verb Length	-.159	.422	-.377	.706
Verb Type (lexical reflexive)	.460	1.288	.357	.721

GLMER analysis of true and lexical reciprocal verb production on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			2.250	1.510
Stimuli : Intercept			2.280	1.510
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	.938	1.122	.836	.403
Trial Order	-.023	.029	-.788	.431
Verb Frequency	.563	.498	1.098	.178
Verb Length	.022	.769	.030	.976
Verb Type (lexical reciprocal)	-1.830	1.564	-1.170	.242

GLMER analysis of true reciprocal and anti-causative verbs on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.091	1.044
Stimuli : Intercept			1.285	1.134
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	-.102	.985	-.104	.917
Trial Order	-.020	.029	-.718	.473
Verb Frequency	.245	.430	.570	.569
Verb Length	-1.260	.781	-1.613	.107
Verb Type (anti-causative)	.552	1.465	.377	.706

Appendix 3c: GLMER analyses on the sample of five-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.423	.650
Stimuli : Intercept			.592	.769
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	2.953	1.173	2.517	.011*
Trial Order	.009	.042	.231	.817
Verb Frequency	.202	.638	.316	.751
Verb Length	.218	.427	.510	.609
Verb Type (lexical reflexive)	-.791	1.330	-.595	.551

GLMER analysis of true and lexical reciprocal verb production on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.013	1.007
Stimuli : Intercept			1.640	1.281
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	1.068	.967	1.104	.269
Trial Order	.032	.030	1.070	.284
Verb Frequency	.098	.512	.192	.848
Verb Length	-.156	.809	-.194	.847
Verb Type (lexical reciprocal)	-1.193	1.416	-.842	.400

GLMER analysis of true reciprocal and anti-causative verbs on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.173	.001
Stimuli : Intercept			.078	.280
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (anti-causative)	2.106	.838	2.511	.012*
Trial Order	.062	.032	1.907	.056.
Verb Frequency	.293	.273	1.076	.282
Verb Length	-2.298	.691	-3.324	.000***
Verb Type (true reciprocal)	3.095	1.032	2.998	.002**

Appendix 3d: GLMER analyses of verb types across groups

GLMER analysis of true reflexive verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.879	.937
Stimuli : Intercept			.447	.669

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (5-year-olds)	3.198	.951	3.362	.000***
Trial Order	.004	.031	.139	.889
Verb Frequency	.844	.411	2.052	.040*
Verb Length	-.033	.434	-.077	.938
Age (3-year-olds)	-2.287	.835	-2.737	.006**
Age (4-year-olds)	-1.567	.837	-1.872	.061.

GLMER analysis of lexical reflexive verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.086	.293
Stimuli : Intercept			.523	.723

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	1.875	.764	2.454	.014*
Trial Order	.002	.026	.085	.932
Verb Frequency	-1.396	.768	-1.817	.069.
Verb Length	.877	.562	1.560	.118
Age (4-year-olds)	.001	.518	.003	.997
Age (5-year-olds)	.944	.598	1.579	.114

GLMER analysis of true reciprocal verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			2.511	1.584
Stimuli : Intercept			.728	.853

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	-.753	.868	-.867	.385
Trial Order	-.019	.029	-.663	.507
Verb Frequency	.084	.424	.199	.842
Verb Length	-1.818	.510	-3.559	.000***
Age (4-year-olds)	1.782	.976	1.825	.067.
Age (5-year-olds)	3.099	1.060	2.923	.003**

GLMER analysis of lexical reciprocal verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.727	.853
Stimuli : Intercept			.119	.346

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (5-year-olds)	.086	.593	.145	.884
Trial Order	.011	.023	.511	.609
Verb Frequency	-.502	.297	-1.688	.091.
Verb Length	.986	.322	3.054	.002**
Age (3-year-olds)	-2.011	.670	-2.998	.002**
Age (4-year-olds)	-1.186	.619	-1.915	.055.

GLMER analysis of anti-causative verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.055	.234
Stimuli : Intercept			.706	.840

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (5-year-olds)	.677	.585	1.156	.247
Trial Order	.031	.023	1.353	.176
Verb Frequency	.033	.440	.076	.939
Verb Length	-.050	.439	-.116	.908
Age (3-year-olds)	-2.923	.580	-5.039	.000***
Age (4-year-olds)	-1.916	.503	-3.802	.000***

GLMER analysis of anti-causative verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.055	.234
Stimuli : Intercept			.706	.840

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	-2.246	.676	-3.322	.000***
Trial Order	.031	.023	1.353	.176
Verb Frequency	.033	.440	.076	.939
Verb Length	-.050	.439	-.116	.908
Age (4-year-olds)	1.007	.507	1.987	.046*
Age (5-year-olds)	2.923	.580	5.039	.000***

Appendix 4: Non-target answers in the pilot

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

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*oblačiti se* 'dress'	*kupa se* bathe.3sg.pres SE 'he is bathing'	/	/
	umivati se 'wash one's face'	*prska* spray.3sg.pres 'he is spraying'	*opera*[21] wash.3sg.pres 'he washes'	/
	brijati se 'shave'	*pokvasi* make wet.3sg.pres 'he makes wet'	*se čisti* SE clean.3sg.pres 'he is cleaning himself' *čisti* clean.3sg.pres 'he is cleaning' *briše se* dry.3sg.pres SE 'he is wiping himself'	*skida zube* take off.3sg.pres teeth.acc 'he is taking off his teeth'
	češljati se 'comb oneself'	*šiša se* cut hair.3sg.pres SE 'she is cutting her hair' *čisti nešto* clean.3sg.pres something.acc 'she is cleaning something'	/	/
	šminkati se 'put on make-up'	/	*ima tu nešto* have.3sg.pres here.adv something.acc 'she has something there'	/
Transitive variants		*oblači trenerke* put on.3sg.pres tracksuits.acc 'he is putting on tracksuits' *skida bradu* take off.3sg.pres beard.acc 'he is taking off beard'	*nešto češlja* something.acc comb.3sg.pres 'she is combing something' *brije bradu* shave.3sg.pres beard.acc 'he is shaving his beard'	*brije brkove* shave.3sg.pres moustache.acc 'he is shaving his moustache' *češlja kosu* comb.3sg.pres hair.acc 'she is combing her hair'

[21] This verb form is incorrect. The correct 3rd person singular present verb form would be *opere*, not *opera*.

	češlja kosu x2 comb.3sg.pres hair.acc 'she is combing her hair' *maže karmin* put on.3sg.pres lipstick.acc 'she is putting on lipstick' *brije bradu* shave.3sg.pres beard.acc 'he is shaving his beard' *pere oči* wash.3sg.pres eyes.acc 'he is washing his eyes'	*stavlja labelo* put on.3sg.pres lip balm.acc 'mum is putting on lip balm'	
Verbs without the clitic *se*	*kupa* 'bathe.3sg.pres'	/	*brije* 'shave.3sg.pres'
Nouns	*lice* 'face' instead of *umiva se* 'wash one's face'	/	/
No answer	4	4	/

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

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*igrati se* 'play'	*prave kulu (od peska)* x2 make.3pl.pres tower.acc of sand.gen 'they are making a sand tower' *kopaju* dig.3pl.pres 'they are digging' *pravu*[22] *pesak od dvorca* make.3pl.pres sand.acc of castle.gen 'they are making sand out of castle'	*prave dvorac* make.3pl.pres castle.acc 'they are making a castle' *prave kulu (u pesku)* x2 make.3pl.pres tower.acc in sand.loc 'they are making a tower (in the sand)'	*prave peščani zamak* make.3pl.pres sand.adj castle.acc 'they are making a sandcastle'
	vrteti se 'spin'	*pravi krug* make.3sg.pres circle.acc 'she is making a circle' *on je stavio nešto u kosu* he.nom put.3sg.past something.acc in hair.acc 'he put something in the hair'	*ona zavija kosu* she turn.3sg.pres hair.acc 'she is turning her hair' *oni se igraju* they.nom SE play.3pl.pres 'they are playing'	/
	uplašiti se 'get scared'	*plače* x2 cry.3sg.pres 'she is crying'	*plače* cry.3sg.pres 'she is crying'	/
Transitive variants		/	/	*igraju dvorac od peska* play.3pl.pres castle.acc of sand.gen 'they are playing a sand castle' *dečak je vrti* boy.nom her spin.3sg.pres 'the boy is spinning her'
Other		*ona ovako* she.nom like this.adv 'she like this' instead of 'turn around'	*srećan* happy.masc 'happy' *tu se srećan* there.adv SE happy.masc 'there happy' *smešan je* funny.masc is 'he is funny' *rasplakana*	*srećan je* happy.masc is 'he is happy' *tužno* sad.neut 'sad'

[22] This verb form is incorrect. The correct 3rd person plural present verb form would be *prave*, not *pravu*.

		teary.fem ‘teary’	
No answer	3	2	1

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

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*ljubiti se* 'kiss each other'	*grle se* hug.3pl.pres SE 'they are hugging each other'	/	/
	tući se ' fight with each other'	*se ljuti* SE angry.3sg.pres 'is angry' *čupaju ruke* pluck.3pl.pres arms.acc 'they are plucking arms' *stave pa tu nešto* put.3pl.pres well here.adv. something.acc 'well they put something there'	/	/
	juriti se 'chase each other'	*trče* x3 run.3pl.pres 'they are running' *beže* x2 run away.3pl.pres 'they are running away' *da ga uhvati* DA he.acc catch.3sg.pres 'to catch him'	*se uhvate* SE catch.3pl.pres 'they catch each other' *igraju se vije* x2 play.3pl.pres SE chasing.gen 'they are playing chasing' *se igraju* SE play.3pl.pres 'they are playing' *igraju vije* play.3pl.pres chasing.gen 'they are playing chasing'	*trče* x3 run.3pl.pres 'they are running' *trče u krug* run.3pl.pres in circle.acc 'they are running in a circle' *igraju se šugice* play.3pl.pres SE tag.gen 'they are playing tag'
	gađati se 'throw something at each other'	*bacaju* x3 throw.3pl.pres 'they are throwing' *se igraju* SE play.3pl.pres 'they are playing' *bace* throw.3pl.pres 'they throw'	*bacaju lopte* throw.3pl.pres balls.acc 'they are throwing balls' *igraju se sa lopticama* play.3pl.pres SE with balls.inst 'they are playing with balls' *bacaju* throw.3pl.pres 'they are throwing' *hvataju*	*bacaju loptice* x2 throw.3pl.pres balls.acc 'they are throwing balls' *dobacuju se* throw.3pl.pres SE 'they are throwing balls at each other'

			catch.3pl.pres ‘they are catching’	
	gledati se ‘look at each other’	*(se) igraju* x2 SE play.3pl.pres ‘they are playing’ *ona ima šnalicu* x2 she.nom have.3sg.pres hairpin.acc ‘she has a hairpin’ *viču* yell.3pl.pres ‘they are yelling’ *oni se smeju* they.nom SE laugh.3pl.pres ‘they are laughing’ *stoje* stand.3pl.pres ‘they are standing’	*razgovaraju* talk.3pl.pres ‘they are talking’ *stoje* x2 stand.3pl.pres ‘they are standing’ *želi da se igraju* want.3sg.pres to SE play.3pl.pres ‘he wants them to play’	*smeju se* x2 laugh.3pl.pres SE ‘they are laughing’
Verbs with full complements		*oči gledaju* eyes.acc look.3pl.pres ‘they are looking at eyes’	/	/
Made-up verbs		*bacaju se* throw.3pl.pres SE ‘they are throwing each other’	/	/
Verbs without the clitic *se*		*ljube* ‘kiss.3pl.pres’	*tuce* ‘fight.3sg.pres’	*ljubi* ‘kiss.3sg.pres’ *gledaju* ‘look.3pl.pres’
Nouns		/	*srce* ‘heart’ instead of *ljubiti se* ‘kiss each other *loptice* ‘balls’ instead of *gađati se* ‘throw something at each other’	/
No answer		9	6	2

Appendix 4d: Non-target answers for lexical reciprocal verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*svađati se* 'argue'	*oni ne pričaju lepo* they.nom not talk.3pl.pres nicely 'they are not talking nicely' *ljute se* be angry.3pl.pres SE 'they are angry'	*viču* x3 yell.3pl.pres 'they are yelling'	*viče/u* x2 yell.3sg/pl.pres 'he/they is/are yelling' *pričaju glasno* talk.3pl.pres loudly 'they are talking loudly'
	trkati se 'race'	*trčaju*[23]*/e/i* x4 run.3pl.pres 'they are running' *hodaju* walk.3pl.pres 'they are walking' *trče do cilja* run.3pl.pres to finishline.gen 'they are running towards the finishline' *vija se* chase.3sg.pres SE 'He is chasing with someone'	*trčaju/e* x5 run.3pl.pres 'they are running' *trče do cilja* run.3pl.pres to finishline.gen 'they are running towards the finishline' *ko će prvi da dođe do onoga* who.nom will.3sg first DA reach.3sg.pres to that.gen 'who will reach that first'	*trče* x5 run.3pl.pres 'they are running' *pokušava jedan ili drugi da pobedi* try.3sg.pres one or other DA win.3sg.pres 'one or the other are trying to win'
	mačevati se/boriti se 'fence/fight'	*ovako tuče se sa ovim* like this.adv fight.3sg.pres SE with this.inst 'he is fighting with this like this' *guraju se* push.3pl.pres SE 'they are pushing each other' *oni seckaju nešto* they.nom chop.3pl.pres something.acc 'they are chopping something'	*brane se* defend.3pl.pres SE 'they are defending themselves' *oni se igraju mačevima* they.nom SE play.3pl.pres swords.inst 'they are playing with swords'	*grebu se* scratch.3pl.pres SE 'they are scratching each other' *udaraju se* hit.3pl.pres SE 'they are hitting each other'
	rukovati se 'shake hands'	*ovako se pozdravljaju* like this.adv SE say hello.3pl.pres 'they are saying hello to each other like this'	*pozdrave se* x2 say hello.3pl.pres SE 'they say hello' *kaže se dobar dan*	*pozdravljaju se* x2 say hello.3pl.pres SE 'they are saying hello to each other' *prižu*[24] *ruku* x2

[23] This verb form is the incorrect version of *trče*.

		daje ruke give.3sg.pres hands.acc 'he is giving hands' *plešu* dance.3pl.pres 'they are dancing' *kažu zdravo* say.3pl.pres hello.acc 'they say hello' *dali su mu ruku* give.3pl.past him hand.acc 'they gave him their hand'	say.3sg.pres SE good day.acc 'you say good afternoon' *čestitaju rodjendan* congratulate.3pl.pres birthday.acc 'they wish happy birthday' *druži se* hang out.3sg.pres SE 'he is hanging out' *pozdravljaju se* say hello.3pl.pres SE 'they are saying hello to each other'	give.3sg.pres hand.acc 'he gives his hand' *drže se rukama/za ruke* x2 hold.3pl.pres SE hands.inst/for hands.acc 'they are holding each other with their hands'
	dobacivati se 'throw a ball at each other'	*igraju se* play.3pl.pres SE 'they are playing' *loptu gađaju* ball.acc shoot.3pl.pres 'they are shooting a ball' *igraju se sa loptom* play.3pl.pres SE with ball.inst 'they are playing with a ball' *bace loptu* throw.3pl.pres ball.acc 'they throw a ball'	*one bacaju košarku* they.nom throw.3pl.pres basketball.acc 'they are throwing basketball' *bacaju lopte* throw.3pl.pres balls.acc 'they are throwing balls' *igraju košarke/odbojku* x2 play.3pl.pres basketball/volleyball.acc 'they are playing basketball/volleyball'	*bacaju loptu* throw.3pl.pres ball.acc 'they are throwing a ball' *igraju se loptom* play.3pl.pres SE ball.inst 'they are playing with a ball'
	sudariti se 'collide'	*oni voze autiće* they.nom drive.3pl.pres cars.acc 'they are driving little cars' *uda(ra)ju se* hit.3pl.pres SE 'they are hitting themselves' *malo se onako pokvario* little SE like that.adv break down.sg.masc 'it broke down a little like that' *pukli se autići* pop.pl.masc SE cars.nom 'the little cars popped'	*udarili se* hit.pl.masc SE 'they hit themselves' *udario autićima* hit.sg.masc cars.inst 'he hit with little cars'	/
Verbs without the clitic *se*		/	*sudarili*	*sudarili*

[24] Vowel epenthesis is present in this verb form. The correct 3rd person singular verb form is *pruži*.

		‘collided.pl’	‘collided.pl’
Made-up verbs	*bijaju se* instead of *mačevati se/boriti se* ‘fence/fight’ *bacaju se* throw.3pl.pres SE ‘they are throwing each other’	/	*događaju se loptom* ‘happen.3pl.pres SE ball.inst’ instead of *dobacivati se* ‘throw a ball at each other’ *ratuju se* ‘war.3pl.pres SE’ instead of *mačevati se/boriti se* ‘fence/fight’
Nouns	*noževe* 'knives.acc' instead of *mačevati se/boriti se* ‘fence/fight’ *sudar* ‘crach’ instead of *sudariti se*‘collide’	*ruke* ‘hands.nom’ instead of *rukovati se* ‘shake hands’ *loptom* ‘ball.inst’ instead of *dobacivati se* ‘throw a ball at each other’	/
Other	*ovako* ‘like this.adv’ instead of *mačevati se/boriti se* ‘fence/fight’ *aaa* onomatopoiea instead of *svađati se* ‘argue’	*oni su sec* they.nom are snip.onomatopoeia ‘they are snip’ instead of *mačevati se/boriti se* ‘fence/fight’ *ljuti* angry.pl.masc ‘angry’ instead of *svađati se* ‘argue’	/
No answer	12	7	2

Appendix 4e: Non-target answers for anti-causative verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*otvoriti se* ‘open’	*može da izađe ovaj auto* can.3sg.pres. DA get out.3sg.pres this car.nom ‘this car can get out’	/	/
	zatvoriti se ‘close’	*uđemo* come in.1pl.pres ‘we come in’	/	*idu krivo* go.3pl.pres aslope.adv ‘they go aslope’
	upaliti se ‘turn on’	*sija* x2 glow.3sg.pres ‘it glows’ *kao da je vatra neka pečena* like that is fire.nom some burnt ‘as if it was some burning fire’ *se pokvario* SE stop working.3sg.masc ‘it stopped working’	*mogli su da vide* can.3pl.past to see.3pl.past ‘they could see’	/
	ugasiti se ‘go out’	*neko je duvao* someone.nom blow.3sg.masc.past ‘someone blew it’ *stala je* stop.3sg.fem.past ‘it stopped’ *izduvala se* blow.3sg.fem SE ‘it blew out’ *dečaci su duvali* boys.nom blow.3pl.past ‘the boys blew’ *polomila se* break.3sg.fem SE ‘it broke’ *to mora da se duva i onda jedemo* that must.3sg.pres DA SE blow.3sg.pres and then eat.1pl.pres	*svećica se tu probušila* candle.nom SE here.adv pierce.3sg.fem ‘the candle pierced there’ *ne gori* not burn.3sg.pres ‘it isn’t burning’ *neko je oduvao* someone.nom blow.3sg.masc.past ‘someone blew it’ *izduvala se* blow.3sg.fem SE ‘it blew out’ *oduvao je* blow.3sg.masc.past ‘he blew it’ *neko je duvao* someone.nom blow.3sg.masc.past ‘someone blew it’	*je izgorela* is burnt.fem.adj ‘it burnt’ *iskrivila se* bent.fem.adj SE ‘it bent’ *neko je duvao* someone.nom blow.3sg.masc.past ‘someone blew it’

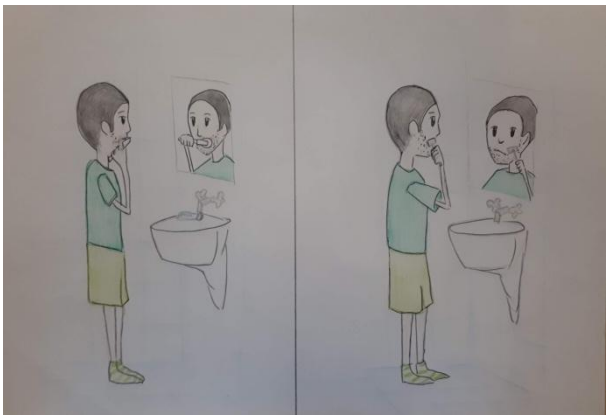
		‘that must be blown and then we eat’		
	pokvariti se ‘stop working’	*nema baterije* not have.3sg.pres battery.gen ‘there is no battery’	/	/
	spojiti se ‘merge’	*nema baterije* not have.3sg.pres battery.gen ‘there is no battery’ *nisu razvojene* are not apart.pl.adj ‘they are not apart’ *sad on spava* now he.nom sleep.3sg.pres ‘now he is sleeping’ *tu je sat* here.adv is clock.nom ‘there is a clock’	*su jedan* are one.number ‘they are one’ *ne radi* not work.3sg.pres ‘it isn’t working’ *stoje* stand.3pl.pres ‘they are not moving’	*su na istom mestu* are in same place.loc ‘they are in the same place’ *su se skupile* SE shrank.3pl.past ‘they shrank’
Verbs with implicit Agents		/	*moraš da zatvoriš* must.2sg.pres DA close.2sg.pres 'you must close'	/
Verbs without the clitic *se*		*otvorila* opened.fem.adj ‘opened’	*upalila* turned on.fem.adj ‘turned on’ *spojile* merged.fem.pl.adj ‘merged’	/
Nouns		*laku noć* ‘good night’ instead of *spojiti se* ‘merge’	*sat* ‘clock’ instead of *spojiti se* ‘merge’	*jedna kazaljka* ‘one hand’ instead of *spojiti se* ‘merge’
Other		*otvorena* x3 opened.fem.adj ‘opened’ *je otvorena* is opened.fem.adj ‘is opened’ *zatvorena* closed.fem.adj ‘closed’ *su zatvorena* are closed.fem.adj	*otvorena* x2 opened.fem.adj ‘opened’ *je otvorena* x3 is opened.fem.adj ‘is opened’ *zatvorena* closed.fem.adj ‘closed’ *zatvorena su* closed.fem.adj are	*je otvorena* x2 is opened.fem.adj ‘is opened’ *zatvorena* closed.fem.adj ‘closed’ *je svetleća* is flashy.fem.adj ‘is flashy’ *su spojene* x2 are merged.pl.adj

	‘are closed’ *upaljena* x3 turned on.fem.adj ‘turned on’ *je dobra* is good.fem.adj ‘it is good’ *je duvana* is blown.fem.adj ‘is blown’ *se iskrivena* SE bent.fem.adj ‘bent’ *pokvaren je* x2 broken.neut.adj is ‘is broken’ *su zatvorene* are closed.pl.adj ‘are closed’ *sastavljene/sklopljene* x2 joined.fem.pl ‘joined’	‘they are closed’ *upaljena* x4 turned on.fem.adj ‘turned on’ *je upaljana* x3 is turned on.fem.adj ‘is turned on’ *pokvaren* broken.masc.adj ‘broken’ *pokvaren je* broken.masc.adj is ‘is broken’ *spojene* merged.fem.pl ‘merged’	‘are merged’ *su sklopljene* are joined.fem.pl ‘are joined’
No answer	8	4	1

Appendix 5: Stimuli

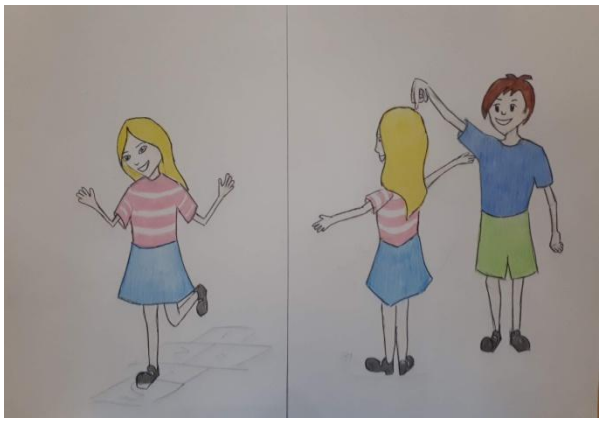
Appendix 5a: Problematic stimuli in the pilot research

brijati se ‘shave’

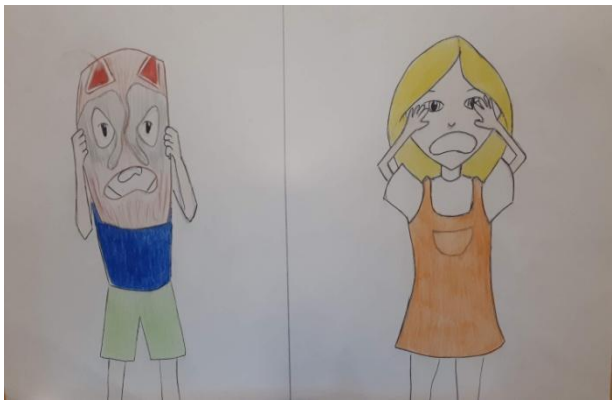


igrati se ‘play’

vrteti se ‘spin’

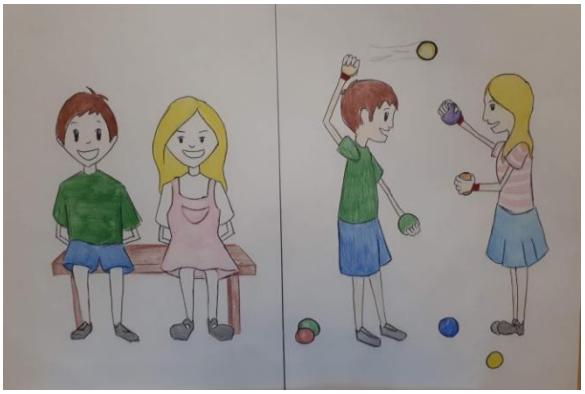


uplašiti se ‘get scared’

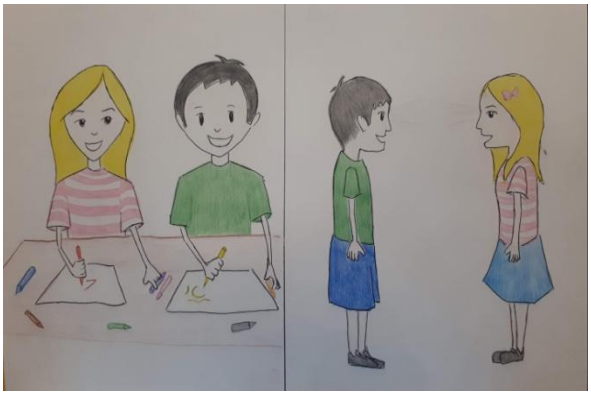


juriti se ‘chase each other’

gađati se ‘throw something at each other’

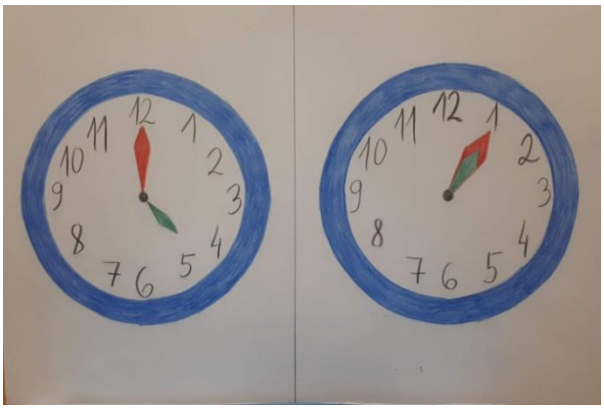


gledati se ‘ look at each other’



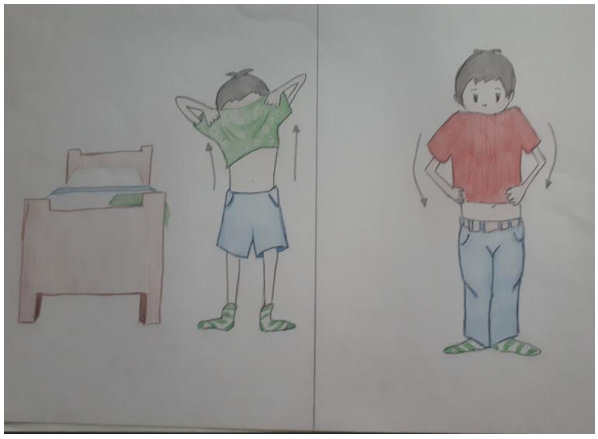
zatvoriti se ‘close’

spojiti se ‘merge’

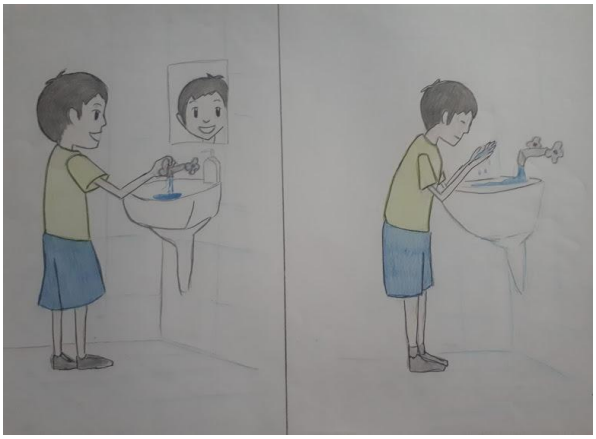


Appendix 5b: Stimuli in the main research

oblačiti se ‘dress’

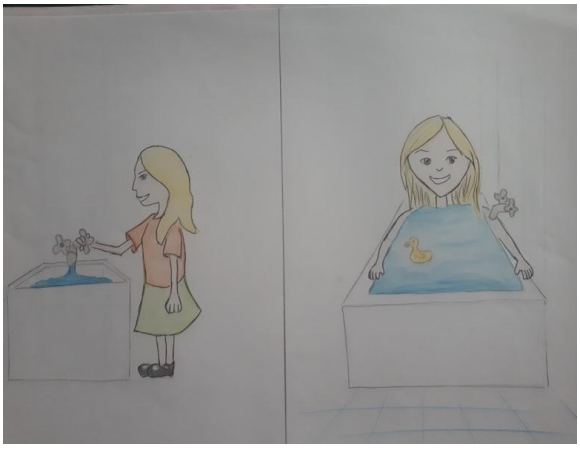


umivati se ‘wash one’s face’

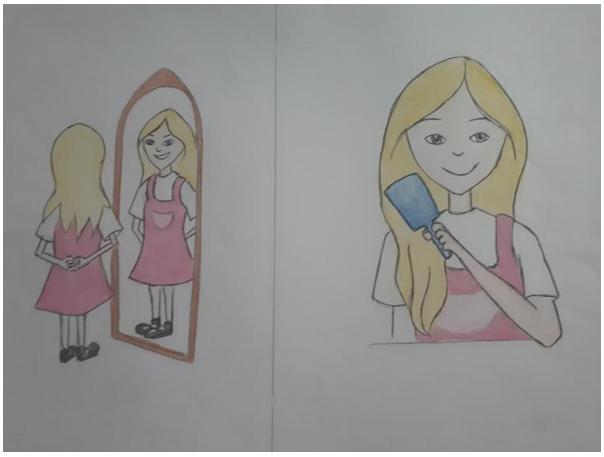


brisati se ‘dry oneself’

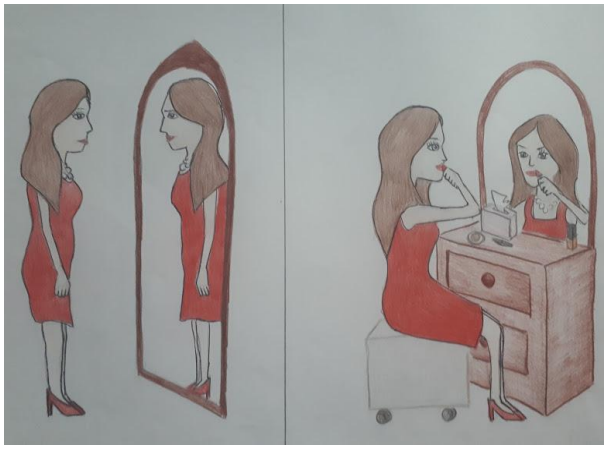
kupati se ‘bathe’



češljati se ‘comb oneself’

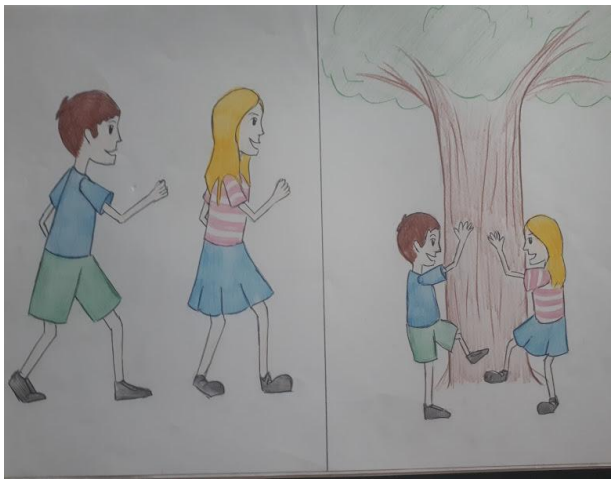


šminkati se ‘put on make-up’



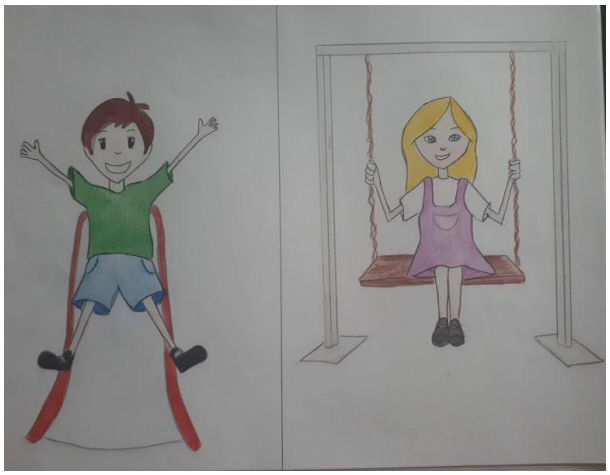
igrati se ‘play’

penjati se ‘climb’

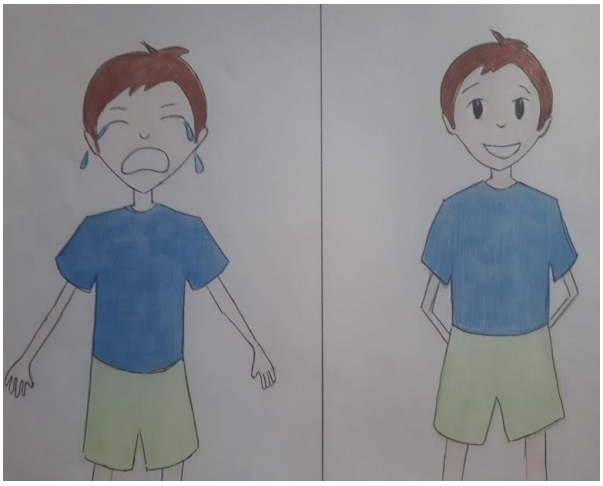


vrteti se ‘spin’

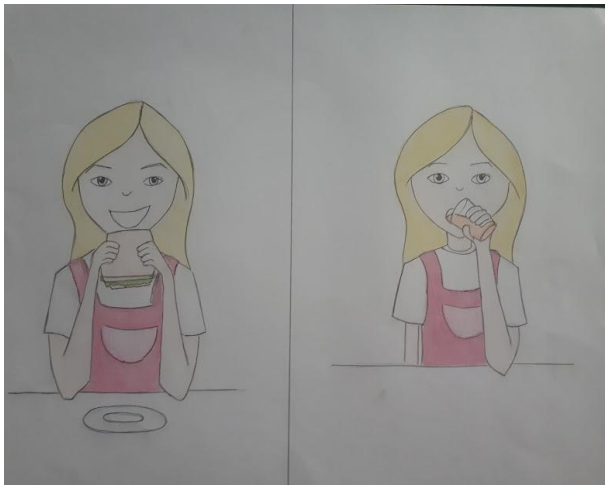
spuštati se ‘slide’; *ljuljati se* ‘swing’



smejati se ‘laugh’

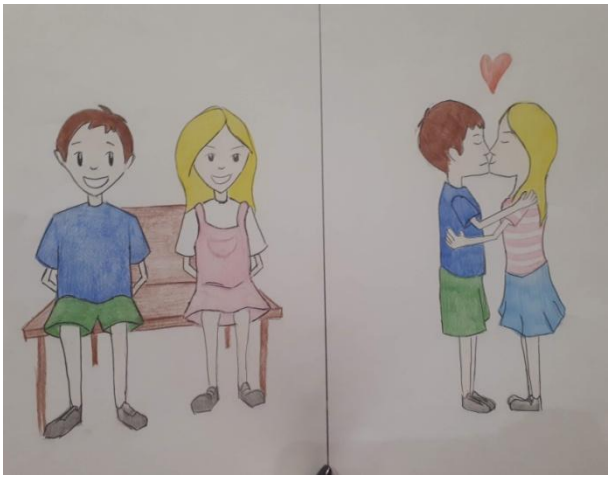


piti ‘drink’ (filler)

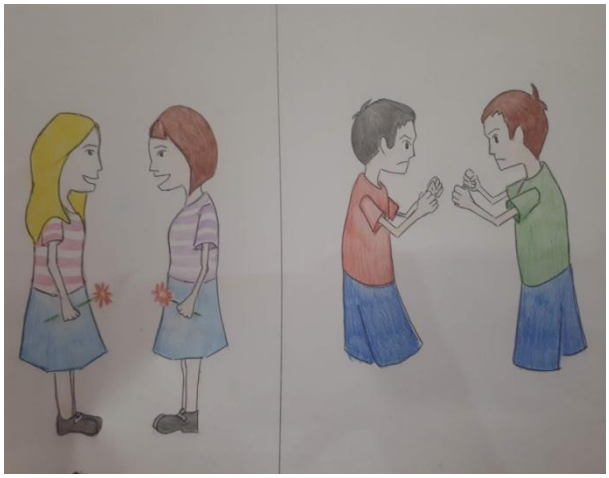


grliti se ‘hug each other’

ljubiti se ‘kiss each other’



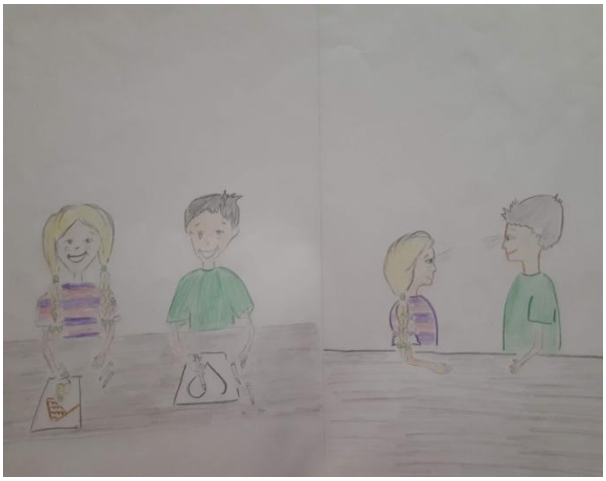
tući se ‘fight with each other’



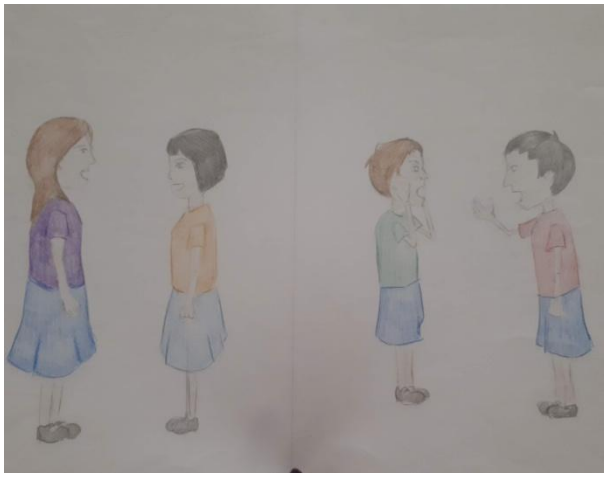
juriti se ‘chase each other’

gađati se ‘throw something at each other’

gledati se ‘ look at each other’



svađati se ‘argue’

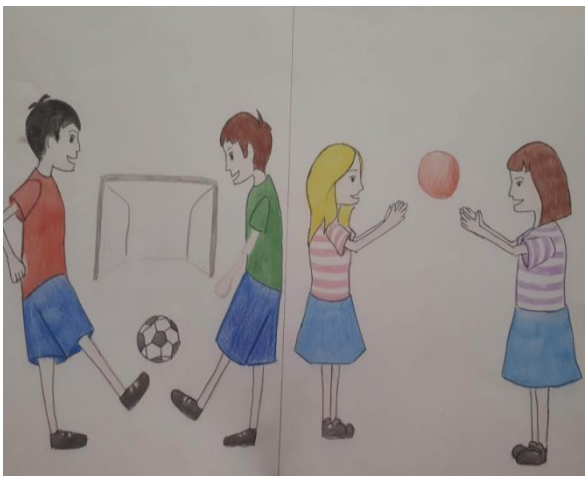


trkati se ‘race’

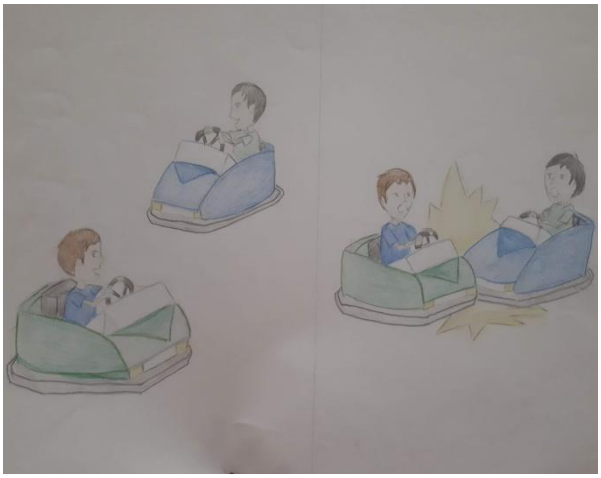
mačevati se/boriti se ‘fence/fight’

rukovati se ‘shake hands’

dobacivati se ‘throw a ball at each other’

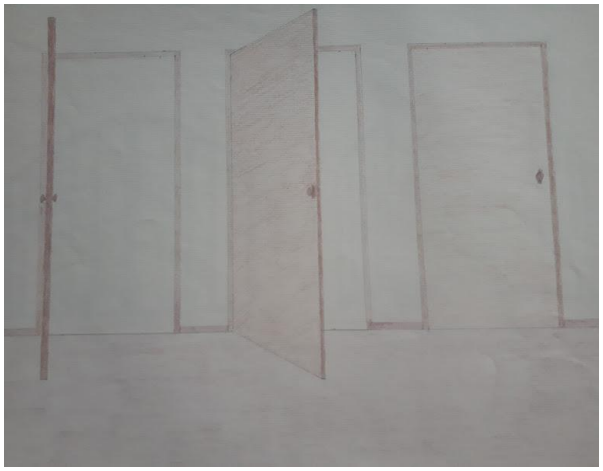


sudariti se ‘collide’

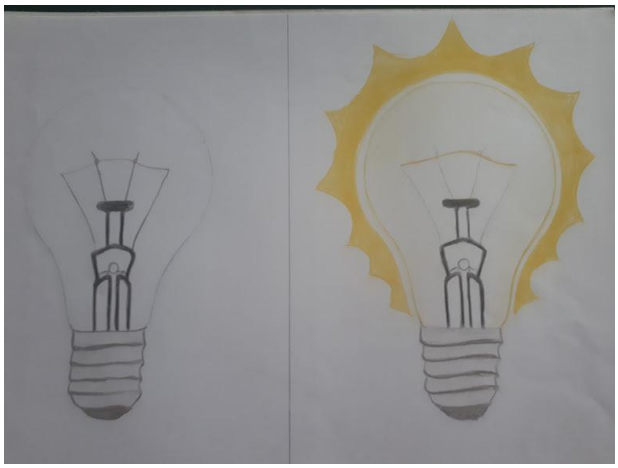


otvoriti se ‘open’

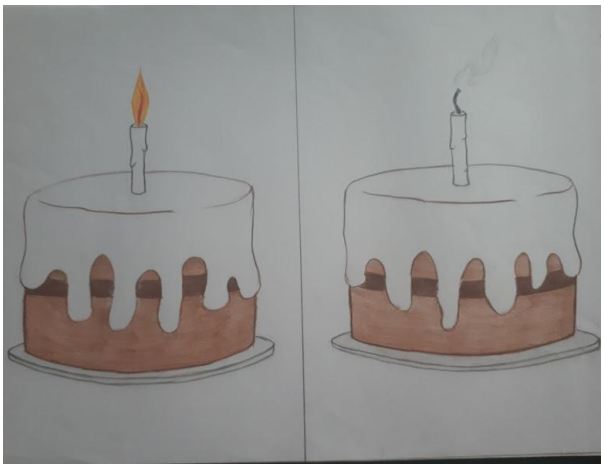
zatvoriti se ‘close’



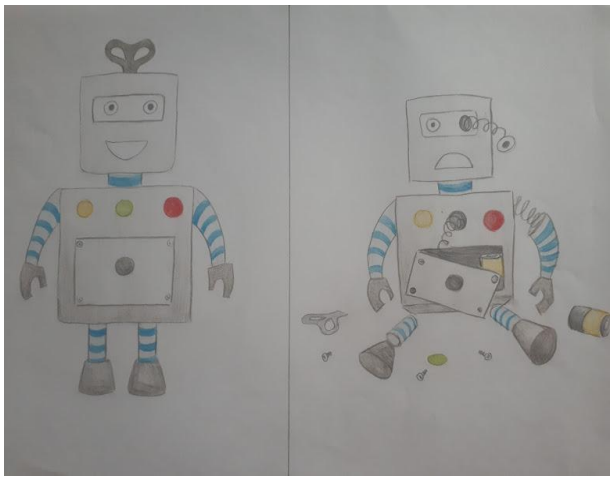
upaliti se ‘turn on’



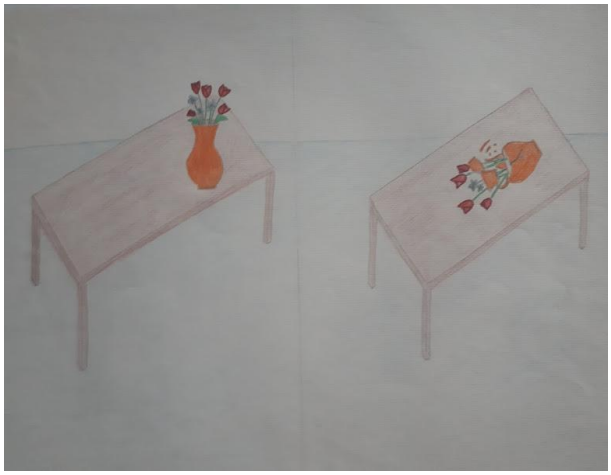
ugasiti se ‘go out’



pokvariti se ‘stop working’



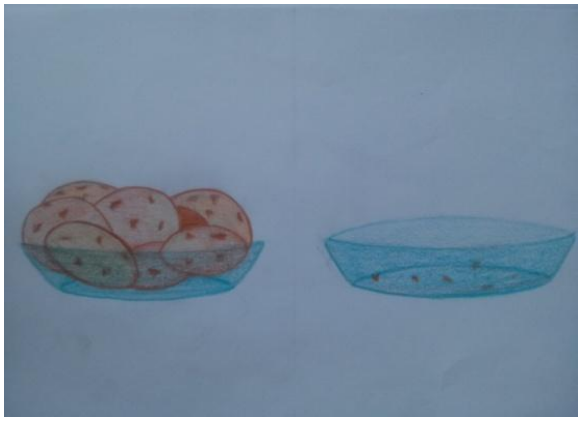
polomiti se ‘break’



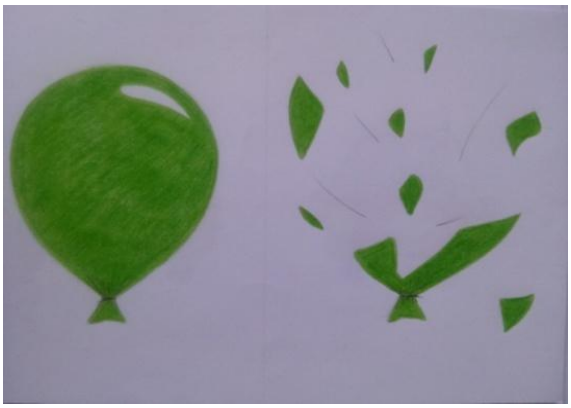
trčati ‘run’ (filler)

voziti ‘drive’ (filler)

imati ‘have’ (filler)



pući ‘pop/burst’ (filler)



jesti ‘eat’ (filler)

pasti ‘fall’ (filler)

Appendix 6: GLMER analyses conducted in the first experiment

Appendix 6a: GLMER analyses on the sample of three-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.869	1.367
Stimuli : Intercept			1.138	1.067
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reflexive)	3.784	.956	3.955	.000***
Trial Order	-.045	.062	-.732	.464
Verb Frequency	-.836	.595	-1.405	.160
Verb Length	-.110	.474	-.234	.815
Verb Type (true reflexive)	-2.019	1.091	-1.850	.064.

GLMER analysis of true and lexical reciprocal verb production on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.366	.605
Stimuli : Intercept			2.759	1.661
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reciprocal)	-.877	.969	-.906	.365
Trial Order	-.024	.050	-.477	.633
Verb Frequency	-.138	.543	-.255	.799
Verb Length	-.613	.744	-.823	.410
Verb Type (true reciprocal)	.124	1.491	.084	.084

GLMER analysis of true reflexive, lexical reflexive, and true reciprocal verbs on the sample of three-year-olds (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.973	.986
Stimuli : Intercept			2.910	1.705
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	1.475	.912	1.617	.105
Trial Order	.025	.021	1.193	.232
Verb Length	-.673	.479	-1.403	.160
Verb Frequency	-.587	.603	-.974	.330
Verb Type (lexical reflexive)	1.471	1.464	1.005	.315
Verb Type (true reciprocal)	-2.623	1.133	-2.315	.020*

GLMER analysis of true reflexive, lexical reflexive, and anti-causative verbs on the sample of three-year-olds (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.535	.731
Stimuli : Intercept			.374	.612
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	.940	.501	1.874	.060.
Trial Order	.032	.016	1.958	.050.
Verb Length	.074	.361	.205	.837
Verb Frequency	-.403	.270	-1.492	.135
Verb Type (anti-causative)	-2.055	.772	-2.661	.007**
Verb Type (lexical reflexive)	1.301	.680	1.912	.055.

GLMER analysis of true reciprocal and anti-causative verbs on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.050	.223
Stimuli : Intercept			1.618	1.272
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	-1.450	.898	-1.615	.106
Trial Order	-.017	.030	-.584	.559
Verb Frequency	.409	.454	.900	.368
Verb Length	-1.556	.763	-2.038	.041*
Verb Type (anti-causative)	2.400	1.416	1.694	.090

Appendix 6b: GLMER analyses on the sample of four-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			2.227	1.492
Stimuli : Intercept			.396	.629
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	3.450	1.084	3.181	.001**
Trial Order	.000	.086	.006	.994
Verb Frequency	.560	.601	.933	.351
Verb Length	.388	.474	.819	.412
Verb Type (lexical reflexive)	1.188	1.031	1.152	.249

GLMER analysis of true and lexical reciprocal verb production on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.631	1.277
Stimuli : Intercept			2.295	1.515
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	1.580	.939	1.682	.092
Trial Order	-.029	.052	-.560	.575
Verb Frequency	.559	.504	1.109	.267
Verb Length	-.248	.690	-.359	.719
Verb Type (lexical reciprocal)	.014	1.333	.011	.991

GLMER analysis of true reciprocal and anti-causative verbs on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.375	.612
Stimuli : Intercept			3.326	1.823
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	-.400	1.032	-.388	.698
Trial Order	.079	.035	2.211	.027*
Verb Frequency	.513	.592	.867	.385
Verb Length	-1.566	.775	-2.020	.043*
Verb Type (anti-causative)	1.743	1.582	1.102	.270

Appendix 6c: GLMER analyses on the sample of five-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.673e-15	4.09e-08
Stimuli : Intercept			0.000e+00	0.00e+00
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	3.868	.947	4.085	.000***
Trial Order	-.183	.103	-1.766	.077.
Verb Frequency	.185	.500	.370	.711
Verb Length	-.045	.406	-.113	.910
Verb Type (lexical reflexive)	2.213	1.091	2.027	.042*

GLMER analysis of true and lexical reciprocal verb production on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.467	.683
Stimuli : Intercept			2.455	1.566
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	1.587	1.049	1.513	.130
Trial Order	.167	.065	2.562	.010*
Verb Frequency	.795	.621	1.280	.200
Verb Length	.162	.842	.193	.847
Verb Type (lexical reciprocal)	-.711	1.575	-.452	.651

GLMER analysis of true reciprocal and anti-causative verbs on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			3.102e-06	.001
Stimuli : Intercept			1.898e+00	1.377
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	2.086	.002	974	<2e-16***
Trial Order	.003	.002	1.8	.069.
Verb Frequency	.282	.002	131.8	<2e-16 ***
Verb Length	-.145	.002	-67.9	<2e-16 ***
Verb Type (anti-causative)	-.505	.002	-236.3	<2e-16 ***

Appendix 6d: GLMER analyses of verb types across groups

GLMER analysis of true reflexive verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.220	.469
Stimuli : Intercept			.162	.402

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	1.317	.418	3.150	.001**
Trial Order	.011	.018	.594	.552
Verb Frequency	-.289	.267	-1.084	.278
Verb Length	-.708	.347	-2.036	.041*
Age (4-year-olds)	1.056	.395	2.672	.007**
Age (5-year-olds)	1.182	.405	2.914	.003**

GLMER analysis of true reflexive verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.220	.469
Stimuli : Intercept			.162	.402

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	2.374	.500	4.744	2.1e-06***
Trial Order	.011	.018	.594	.552
Verb Frequency	-.289	.267	-1.084	.278
Verb Length	-.708	.347	-2.036	.041*
Age (3-year-olds)	-1.056	.395	-2.672	.007**
Age (5-year-olds)	.125	.460	.272	.785

GLMER analysis of lexical reflexive verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.656	.810
Stimuli : Intercept			.978	.989

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	4.379	1.175	3.726	.000***
Trial Order	-.185	.094	-1.961	.049*
Verb Frequency	-.430	.813	-.529	.597
Verb Length	1.384	.740	1.869	.061.
Age (4-year-olds)	2.074	.722	2.873	.004**
Age (5-year-olds)	3.294	1.118	2.945	.003**

GLMER analysis of lexical reflexive verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.656	.810
Stimuli : Intercept			.978	.989

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	6.455	1.431	4.508	6.54e-06***
Trial Order	-.185	.094	-1.962	.049*
Verb Frequency	-.430	.813	-.529	.597
Verb Length	1.384	.740	1.869	.061.
Age (3-year-olds)	-2.074	.722	-2.873	.004**
Age (5-year-olds)	1.219	1.200	1.015	.309

GLMER analysis of true reciprocal verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.156	.396
Stimuli : Intercept			1.272	1.128

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	-.576	.603	-.955	.339
Trial Order	.036	.042	.845	.397
Verb Frequency	1.539	.632	2.434	.014*
Verb Length	-1.872	.642	-2.912	.003**
Age (4-year-olds)	1.676	.385	4.349	.000***
Age (5-year-olds)	2.777	.430	6.456	.000***

GLMER analysis of true reciprocal verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.156	.396
Stimuli : Intercept			1.272	1.128

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	1.100	.611	1.800	.071.
Trial Order	.036	.042	.845	.398
Verb Frequency	1.539	.632	2.434	.014*
Verb Length	-1.872	.642	-2.912	.003**
Age (3-year-olds)	-1.676	.385	-4.349	.000***
Age (5-year-olds)	1.101	.372	2.958	.003**

GLMER analysis of lexical reciprocal verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.497	.705
Stimuli : Intercept			.314	.560

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	-1.477	.462	-3.193	.001**
Trial Order	.031	.040	.777	.437
Verb Frequency	.702	.335	2.091	.036*
Verb Length	.746	.322	2.317	.020*
Age (4-year-olds)	2.406	.346	6.950	.000***
Age (5-year-olds)	3.043	.393	7.743	.000***

GLMER analysis of lexical reciprocal verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.497	.705
Stimuli : Intercept			.314	.560

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	.929	.442	2.100	.035*
Trial Order	.031	.040	.777	.437
Verb Frequency	.702	.335	2.091	.036*
Verb Length	.746	.322	2.317	.020*
Age (3-year-olds)	-2.406	.346	-6.950	.000***
Age (5-year-olds)	.637	.342	1.860	.062.

GLMER analysis of anti-causative verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.240	.490
Stimuli : Intercept			.655	.809

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	-.655	.466	-1.405	.160
Trial Order	.016	.014	1.072	.284
Verb Frequency	-.113	.380	-.298	.766
Verb Length	.102	.377	.272	.786
Age (4-year-olds)	1.156	.295	3.909	.000***
Age (5-year-olds)	1.814	.319	5.676	.000***

GLMER analysis of anti-causative verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.240	.490
Stimuli : Intercept			.655	.809

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	.500	.460	1.088	.276
Trial Order	.016	.014	1.072	.284
Verb Frequency	-.113	.380	-.298	.766
Verb Length	.102	.377	.272	.786
Age (3-year-olds)	-1.156	.295	-3.909	.000***
Age (5-year-olds)	.657	.312	2.106	.035*

Appendix 7: Non-target answers in the first experiment

Appendix 7a: Non-target answers for true reflexive verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*oblačiti se* 'dress'	*ne se skida* not SE take off.3sg.pres 'not is getting undressed'	/	/
	umivati se 'wash one's face'	*ovako trljaš* like this.adv 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 'dry 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 dry.3sg.pres her face.acc with this.inst 'she is wiping her face with this'	/	/
Transitive variants		*umivam lice* wash.1sg.pres face.acc 'I am washing my face' *briše (svoja) usta* (2x) dry.3sg.pres (self) mouth.acc 'she is drying her mouth' *pere lice* (3x) wash.3sg.pres face.acc 'he is washing his face' *briše lice* dry.3sg.pres face.acc 'she is drying her face' *kosu četka* hair.acc brush.3sg.pres 'she is brushing her hair' *obrišemo ruke* dry.1pl.pres hands.acc 'we dry our hands' *obuče majicu* put on.3sg.pres T-shirt.acc 'he puts on a T-shirt'	*briše usta /lice* (3x) dry.3sg.pres mouth/face.acc 'she is drying her mouth/face' *češlja kosu* (2x) comb.3sg.pres hair.acc 'she is combing her hair' *maže šminku/usne* (2x) put on.3sg.pres make-up/lips.acc 'she is putting on make-up/lipstick' *pere lice* wash.3sg.pres face.acc 'he is washing his face' *oblači majicu* put on.3sg.pres T-shirt.acc 'he is putting on a T-shirt'	*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) comb.3sg.pres hair.acc 'she is combing her hair' *šminka usta* put on make-up.3sg.pres lips.acc 'she is putting on lipstick' *oblači majicu* put on.3sg.pres T-shirt.acc 'he is putting on a T-shirt' *briše usta* (2x) 'dry.3sg.pres mouth.acc 'she is drying her mouth'

	maže usta put on.3sg.pres lips.acc 'she is putting on lipstick' *obukao odeću* put on.3sg.masc clothes.acc 'he put on clothes'		
Verbs without the clitic *se*	*obucio*[25] dressed.3sg.masc *maze* put on.3sg.pres	/	/
Nouns	*tu majicu* that T-shirt.acc instead of *oblači se* 'he is dressing'	/	/
Other	*on se ovako* he.nom SE like this.adv instead of *umiva se* 'he is washing his face'	/	/
No answer	7	1	/

[25] This verb form is incorrect. The correct 3rd person singular past verb form would be *oblačio*, not *obucio*.

Appendix 7b: Non-target answers for lexical reflexive verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
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 ‘spin’	*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 ‘she is not crying’	/	/
Verbs without the clitic *se*		*igra* (2x) play.3sg.pres	*vrti* spin.3sg.pres	/
Other		*srećan je* (2x) happy.adj.masc is ‘he is happy’ instead of *smeje se* ‘he is laughing’ *je dobar* is good.adj.masc ‘he is good’ instead of *smeje se* ‘he is laughing’	/	/
No answer		4	/	/

Appendix 7c: Non-target answers for true reciprocal verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*grliti se* 'hug each other'	*volu se*[26] love.3pl.pres SE 'they love each other'	/	/
	tući se ' fight with each other'	*dira se po licu* touch.3sg.pres SE on face.loc 'he is touching his face'	/	/
	juriti se 'chase each other'	*igraju se jurke/šuge* x2 play.3pl.pres SE chasing/tag.gen 'they are playing chasing/tag' *igraju se* x4 play.3pl.pres SE 'they are playing' *beže* x3 run away.3pl.pres 'they are running away' *skačaju*[27] jump.3pl.pres 'they are jumping' *trče/trčeju/tućaju*[28] x6 run.3pl.pres 'they are running'	*oni se igraju* they.nom SE play.3pl.pres *vije/vile/šuge/jurke/žmurke* x7 chasing/tag/hide and seek.gen 'they are playing chasing/tag/hide and seek' *trče* x6 run.3pl.pres 'they are running' *igraju šuge* play.3pl.pres tag.gen 'they are playing tag'	*igraju se šuge/vije/jurke* x8 play.3pl.pres SE tag.gen 'they are playing chasing/tag' *trče* x2 run.3pl.pres 'they are running' *oni se igraju* they.nom SE play.3pl.pres 'they are playing'
	gađati se 'throw something at each other'	*tuču se/udaraju se (jastucima)* x3 fight.3pl.pres SE pillows.inst 'they are fighting/hitting each other with pillows' *oni se igraju (udaranja) sa jastucima* x2 they.nom SE play.3pl.pres hitting with pillows.inst 'they are playing (hitting) with	*igraju se jastucima* play.3pl.pres SE pillows.inst 'they are playing with pillows' *bacaju jastuke* throw.3pl.pres pillows.acc 'they are throwing pillows' *igraju se* play.3pl.pres 'they are playing'	*bacaju jastuke* throw.3pl.pres pillows.acc 'they are throwing pillows' *bacaju* 'throw.3pl.pres' 'they are throwing'

[26] This verb form is incorrect. The correct 3rd person plural present verb form would be *vole se*, not *volu se*.
[27] This verb form is incorrect. The correct 3rd person plural present verb form would be *skaču*, not *skačaju*.
[28] *Trčeju* and *tućaju* are incorrect versions of *trče*.

		pillows' *bacaju jastuke* x2 throw.3pl.pres pillows.acc 'they are throwing pillows' *bacaju loptu tu* throw.3pl.pres ball.acc here.adv 'they are throwing the ball here' *se igraju* x3 play.3pl.pres 'they are playing' *on je ovo bacio da padne na devojčicu* he throw.3sg.past this to fall.3sg.pres on girl.acc 'he threw this so that it falls on the girl' *vataju se* catch.3pl.pres SE 'they are catching each other' *bore se* fight.3pl.pres SE 'they are fighting' *baca devojčica na dečaka a dečak na devojčicu* throw.3sg.pres girl.nom on boy.acc and boy.nom on girl.acc 'the girl is throwing at the boy and the boy at the girl' *igraju* play.3pl.pres 'they are playing' *bacaju* 3x throw.3pl.pres 'they are throwing'	*bacaju* x5 throw.3pl.pres 'they are throwing' *bacaju ih* throw.3sg.pres them 'they are throwing them' *tuču se/udaraju se (jastucima)* x3 fight.3pl.pres.SE pillows.inst 'they are fighting/hitting each other with pillows'	
	gledati se 'look at each other'	*on je stavio neku smešnu kapu* he put.3sg.past a funny hat.acc 'he put a funny hat' *ona je napravila pletenicu* she.nom make.3sg.past braid.acc 'she made a braid'	*stoje* stand.3pl.pres 'they are standing' *druže se* hang out.3pl.pres SE 'they are hanging out'	*pričaju x2* talk.3pl.pres 'they are talking' *druže se* hang out.3pl.pres SE 'they are hanging out'

		se mire SE make up.3pl.pres 'they are making up' *cmeje se* laugh.3sg.pres SE 'he/she is laughing' *sede* sit.3pl.pres 'they are sitting' *se igraju* x2 play.3pl.pres 'they are playing' *pričaju* talk.3pl.pres 'they are talking' *to radu* that do.3pl.pres 'they are doing that' *se pozdravljaju* SE say hello.3pl.pres 'they are saying hello to each other'		
Verbs with full complements		*gledamo oči* look.1pl.pres eyes.acc 'we are looking at eyes' *dečak je ljubio devojčicu* boy.nom kiss.3sg.past girl.acc 'the boy was kissing the girl' *gledaju batu i seku* look.3pl.pres boy.acc and girl.acc 'they are looking at the boy and the girl' *poljubeju*[29] *poljubac* kiss.3pl.pres kiss.acc instead of *ljubiti se* 'kiss each other'	*brat gleda u seku* brother.nom look.3sg.pres at sister.acc *a seka gleda u brata* and sister.nom look.3sg.pres at brother.acc 'the brother is looking at his sister and the sister is looking at her brother'	*grle jedan drugog* hug.3pl.pres each other 'they are hugging each other' *gledaju jedan u drugog/jedno u drugo* x2 'look.3pl.pres one at another' 'they are looking at each other'
Verbs without the clitic *se*		*oni hoće da zagrle* they.nom want.3pl.pres to hug.3pl.pres 'they want to hug'	*ljube* x4 kiss.3pl.pres 'they are kissing' *ljubi*	*vijaju* chase.3pl.pres 'they are chasing'

[29] This verb form is incorrect. The correct 3rd person plural present form is *poljube*.

	ljubi kiss.3sg.pres 'he/she is kissing' *tuče* fight.3sg.pres 'he/she is fighting'	kiss.3sg.pres 'he/she is kissing'	
Made-up verbs	*oni se pričaju* they SE talk.3pl.pres instead of *gledaju se* 'they are looking at each other'	/	/
Nouns	*juranje* 'chasing' instead of *juriti se* 'chase each other'	/	/
Other	*ovako* 'like this.adv' instead of *tući se* 'fight with each other' *ovako rukom* 'like this.adv hand' instead of *gledati se* 'look at each other'	/	/
No answer	8	5	2

Appendix 7d: Non-target answers for lexical reciprocal verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*svađati se* 'argue'	*viku*[30] *i oni se ljute* yell.3pl.pres and they.nom SE angry.3pl.pres 'they are yelling and they are angry' *ovaj viče na njega* this.nom yell.3sg.pres at him *ovaj stavi ruke da ništa ne čuje* this.nom put.3sg.pres hands.acc to nothing.acc not hear.3sg.pres 'this one yells at him and this one puts his hands so he doesn't hear anything' *viču* x4 yell.3pl.pres 'they are yelling' *(dečaci) se ljute* x5 boys.nom SE angry.3pl.pres 'the boys are angry' *on se naljutio* he.nom SE get angry.3sg.past 'he got angry' *izađu napolje* get.3pl.pres out 'they get out'	*viču jedno na drugog* yell.3pl.pres one at another 'they are yelling at each other' *se ljute* SE angry.3pl.pres 'they are angry'	*oni jako viče*[31] they.nom strongly.adv yell.3sg.pres 'they are yelling strongly' *viču* yell.3pl.pres 'they are yelling' *ljute se* angry.3pl.pres SE 'they are angry'
	trkati se 'race'	*trče* x14 run.3pl.pres 'they are running' *vijaju* x2 chase.3pl.pres 'they are chasing'	*trče ko će pobediti ka cilju* run.3pl.pres who will.3sg win.inf towards finishline.dat 'they are running who will win towards the finishline' *trče(u)* x9	*trče* x5 run.3pl.pres 'they are running'

[30] This verb form is incorrect. The correct 3rd person plural present verb form would be *viču*, not *viku*.
[31] This participant used the 3rd person singular instead of the third person plural form.

		ovde će neko pobediti here.adv will.3sg someone.nom win.inf 'here someone will win'	run.3pl.pres 'they are running'	
	mačevati se/boriti se 'fence/fight'	*tuku se* x3 *(preko mača)* fight.3pl.pres SE through sword.gen 'they are fighting (through a sword)' *oni se ovako ljute štapom* they.nom SE like this.adv angry.3pl.pres stick.inst 'they are angry with a stick like this' *udaraju se (sa mačom)* x3 hit.3pl.pres SE (with sword.inst) 'they are hitting each other with a sword' *igraju se* play.3pl.pres SE 'they are playing' *nož uzeli* knife.acc take.pl 'took a knife' *seču drva*[32] cut.3pl.pres trees.acc 'they are cutting trees' *udare štapom* hit.3pl.pres stick.inst 'they hit with a stick'	*mačom se ovako udaraju* sword.inst SE like this.adv hit.3pl.pres 'they are hitting each other with a sword like this' *se igraju borbu mačevima i štitovima* SE play.3pl.pres fight.acc swords.inst and shields.inst 'they are playing fight with swords and shields'	/
	rukovati se 'shake hands'	*pozdravljaju se* x4 say hello.3pl.pres SE 'they are saying hello to each other' *oni idu napolje* they go.3pl.pres out 'they are going out' *kad je nekom rođendan* when is someone.dat birthday.nom *onda se pozdrave* then.adv SE say hello.3pl.pres 'when it's someone's birthday then	*dogovaraju se* make a deal.3pl.pres SE 'they are making a deal' *pozdravljaju se* x3 say hello.3pl.pres SE 'they are saying hello to each other' *daju ruku* give.3pl.pres hand.acc 'they are giving their hand' *drže se* hold.3pl.pres SE	*drže/hataju se za ruke* hold/catch.3pl.pres SE for hands.acc 'they are holding each other's hands' *pozdravljaju se* x4 say hello.3pl.pres SE 'they are saying hello to each other' *žele da se pomire* want.3pl.pres to SE make up.3pl.pres 'they want to make up' *daju ruku* give.3pl.pres hand.acc

[32] This verb form is incorrect. The correct 3rd person plural present verb form would be *seku*, not *seču*.

		they say hello *daju ruku* give.3pl.pres hand.acc 'they are giving their hand' *tapšu* clap.3pl.pres 'they are clapping' *igraju se* play.3pl.pres SE 'they are playing' *se držu za ruku* 'SE hold/catch.3pl.pres for hand.acc' 'they are holding each other's hand'	'they are holding each other' *kaže čestitam* say.3sg.pres congratulate.1sg.pres 'he says congratulations' *mašu rukama* wave.3pl.pres hands.inst 'they are waving with their hands' *marširaju* march.3pl.pres 'they are marching'	'they are giving their hand'
	dobacivati se 'throw a ball at each other'	*bacaju (loptu)* x6 throw.3pl.pres ball.acc 'they are throwing the ball' *igraju *loptu* play.3pl.pres ball.acc 'they are playing ball' *igraju se* play.3pl.pres SE 'they are playing' *igramo loptu* play.1pl.pres ball.acc 'we are playing ball' *uhvataju loptu*[33] catch.3pl.pres ball.acc 'they catch the ball' *bacamo loptu jedan drugom* throw.1pl.pres ball.acc one another 'we are throwing the ball to each other'	*bacaju (loptu)* x3 throw.3pl.pres ball.acc 'they are throwing the ball' *igraju odbojku* play.3pl.pres volleyball.acc 'they are playing volleyball' *igraju* play.3pl.pres 'they are playing' *baca jedan-jedan jedan-jedan* throw.3sg.pres one-one one-one 'he is throwing one-one one-one'	*igraju odbojku* play.3pl.pres volleyball.acc 'they are playing volleyball' *igraju se* play.3pl.pres SE 'they are playing' *bacaju sebi loptu* throw.3pl.pres self.dat ball.acc 'they are throwing the ball to themselves'
	sudariti se 'collide'	*zgazili su zvezde* step.3pl.past stars.acc 'they stepped on the stars' *kaže bam* say.3sg.pres bang	*oni se udare* x2 they.nom SE hit.3pl.pres 'they hit each other'	*oni su se udarili* x2 they.nom SE hit.3pl.past 'they hit each other'

[33] The verb form *uhvataju* is incorrect. The correct 3rd person plural present verb form would be *uhvate.*

		‘it says bang’ *palo je sunce* fall.3sg.past sun.nom ‘the sun fell’ *oni se udaraju* they.nom SE hit.3pl.pres ‘they hit each other’ *voze* drive.3pl.pres ‘they are driving’ *udarila* hit.fem ‘hit’ *udarili se* ‘hit.3pl SE’ ‘they hit each other’ *udario se auto* ‘hit.3sg.past SE car.nom’ ‘the car hit itself’ *neko im je pokvario* someone they.dat break.3sg.past ‘someone broke them’		
Verbs without the clitic *se*		*sudarili* ‘collided.pl’	/	*dobacivaju*[34] ‘throw a ball at each other.3pl.pres’
Made-up verbs		*majaju se* instead of *mačuju se/bore se* ‘they are fencing/fighting’ *hvataju se loptom* ‘catch.3pl.pres SE ball.inst’ instead of *dobacuju se* ‘they are throwing a ball at each other’	*bacaju se* ‘throw.3pl.pres SE’ instead of *dobacuju se* ‘they are throwing a ball at each other’	*zamahuju se* ‘brandish.3pl.pres SE’ instead of *rukuju se* ‘they are shaking hands’
Nouns		*dobar dan.acc* ‘good day’ instead of *rukovati se* ‘shake hands’ *sudar* ‘crash’ instead of *collide* ‘sudariti se’	*dobar dan.acc* ‘good day’ instead of *rukovati se* ‘shake hands’ *sudar* ‘crash’ instead of *collide* ‘sudariti se’	/
Other		*ovako* ‘like this.adv’ instead of	*ljuti su*	

[34] The verb form *dobacivaju* is incorrect. The correct 3rd person plural present verb form would be *dobacuju*.

	svađati se ‘argue’ *ljuti su* ‘angry.pl.masc are’ instead of *svađati se* ‘argue’ *ne dobro* ‘not good’ instead of *svađati se* ‘argue’ *zdravo* ‘hello’ instead of *rukovati se* ‘shake hands’ *ovako ovako* ‘like this like this.adv’ instead of *mačevati se/boriti se* ‘fence/fight’	‘angry.pl.masc are’ instead of *svađati se* ‘argue’	/
No answer	10	2	/

Appendix 7e: Non-target answers for anti-causative verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	open ‘otvoriti se’	*ovde možeš da izađeš* here.adv 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.adv 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 get out.3pl.past and was bang.nom ‘the children got out and there was a bang’ *polomila se* break.3sg.fem SE ‘it broke’ *sudare se* collide.3pl.pres SE ‘they collide’ *mora da ih otključa* must.3sg.pres DA them unlock.3sg.pres ‘he/she needs to unlock them’	*ne mogu da se otvore* not can.3pl.pres DA SE open.3pl.pres ‘they cannot be opened’	/

	upaliti se ‘turn on’	*ovde radi* here.adv 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.adv work.3sg.pres ‘it’s working now’ *proradilo* work.3sg.neut again ‘it works 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* 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*	*ne gori (3x)* not burn.3sg.pres ‘it is not burning’ *dunula je* blow.3sg.fem.past ‘she blew it’ *ne radi* not work.3sg.pres ‘it is not working’ *nije tu bila vatra* not be.3sg.pres there was fire.nom ‘there wasn’t fire’ *neko je oduvao* someone.nom blow.3sg.masc.past ‘someone blew it’ *oduvalo* blown.3sg.neut ‘blown’ *dunu* blow.3pl.pres ‘they blow’	*izduvala se* blow.3sg.fem SE ‘it blew out’ *izgorela* burnt.3sg.fem ‘burnt’ *nema više* not have.3sg.pres more ‘there is no more’ *neko je oduvao (3x)* someone.nom blow.3sg.masc.past ‘someone blew it’ *ne gori* not burn.3sg.pres ‘it isn’t burning’ *je nema* she.acc not have.3sg.pres ‘there isn’t one’ *isključila se* turn off.3sg.fem SE ‘it turned off’ *je izgorela*

		not smoke.3sg.pres ‘it isn’t smoking’ *duva* blow.3sg.pres ‘he/she is blowing’		burn.3sg.fem.past ‘it burnt’
	pokvariti se ‘stop working’	*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* go out.3sg.neut.past he.dat electricity.gen ‘his electricity went out’	/	*poludi* go crazy.3sg.pres ‘he goes crazy’
	polomiti se ‘break’	*palo (2x)* fell.3sg.neut ‘fell’ *prosula se* spill.3sg.fem SE ‘it spilt’ *pala je* fall.3sg.fem.past ‘it fell’ *srušilo* knocked off.3sg.neut ‘knocked off’ *pokvarila se (2x)* stop working.3sg.fem SE ‘it stopped working’ *pokidala se* ‘rip.3sg.fem SE’ ‘it ripped’	*pukla je* crack.3sg.fem.past ‘it cracked’ *srušila* knocked off.3sg.fem ‘knocked off’ *vaza se pokvarila* stop working.3sg.fem SE ‘the vase stopped working’	*pala i puknula* fall.3sg.fem and crack.3sg.fem ‘it fell and cracked’
Transitive verbs		*polomio oko* break.3sg.masc eye.acc ‘broke eye’ *ot(v)ori(li) su* open.3pl.past ‘they opened’	*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’

	neko je ugasio tu svećicu someone.nom blow.3sg.past that candle.acc 'someone blew that candle' *onda su tu stavili vrata i zatvorili* then here.adv 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' *vaza dole stoji i razbila* 'vase.nom down.adv stand.3sg.pres and break.3sg.fem' *otvarala* 'open.3sg.fem' *upalilo* 'turn on.3sg.neut'	*palo i razbilo* 'fall.3sg.neut and break.3sg.masc'	*otvarala* 'open.3sg.fem'
Made-up verbs	*plujava* instead of *polomila se* 'it broke' *oduvalo se* blow out.3sg.neut SE instead of *ugasila se* 'it went out'	*se ispalila* instead of *se ugasila* 'it went out' *ovde se oduvala (2x)* here.adv SE blow out.3sg.fem instead of *ugasila se* 'it went out'	*oduvala se* blow out.3sg.fem SE instead of *ugasila se* 'it went out'
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* 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 'gate is opened' *jedna je zatvorena* one is closed.fem.adj 'one is closed' *otvorena* open.fem.adj 'opened'	*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' *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.adv closed 'this one is completely closed' *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'	*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 gone out.fem.adj 'is gone out' *se polomljena* SE broken.fem.adj 'broken' *je polomljena* is broken.fem.adj 'is broken'
No answer	4	1	/

Appendix 8: GLMER analyses conducted in the repeated experiment

Appendix 8a: GLMER analyses on the sample of three-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.256	.506
Stimuli : Intercept			.557	.746
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	3.110	.880	3.532	.000***
Trial Order	-.121	.081	-1.499	.133
Verb Frequency	-.301	.543	-.556	.578
Verb Length	-.103	.404	-.256	.797
Verb Type (lexical reflexive)	1.637	.988	1.656	.097

GLMER analysis of true and lexical reciprocal verb production on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			1.423	1.198
Stimuli : Intercept			4.448	2.001
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reciprocal)	-.785	.894	-.877	.201
Trial Order	-.019	.028	-.328	.782
Verb Frequency	-.129	.463	-.244	.768
Verb Length	-.545	.688	-.723	.349
Verb Type (true reciprocal)	.113	1.381	.075	.927

GLMER analysis of true reciprocal and anti-causative verbs on the sample of three-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.050	.223
Stimuli : Intercept			1.888	1.384
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	.949	.835	1.137	.255
Trial Order	-.183	.048	-.483	.648
Verb Frequency	.423	.398	.832	.274
Verb Length	-1.234	.763	-1.036	.086
Verb Type (anti-causative)	.400	.428	.758	.346

Appendix 8b: GLMER analyses on the sample of four-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			23.665	4.864
Stimuli : Intercept			.834	.913
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (lexical reflexive)	5.265e+01	7.144e+06	.002	.998
Trial Order	2.685e-01	2.194e-01	1.224	.221
Verb Frequency	9.685e-01	1.131e+00	.856	.392
Verb Length	-1.894e-01	1.148e+00	-.165	.869
Verb Type (true reflexive)	-4.602e+01	7.144e+06	.002	.998

GLMER analysis of true and lexical reciprocal verb production on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.648	.805
Stimuli : Intercept			2.405	1.551
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	2.801	1.091	2.565	0.013*
Trial Order	.058	.069	.839	.401
Verb Frequency	.890	.625	1.424	.154
Verb Length	.140	.826	.171	.864
Verb Type (lexical reciprocal)	-.397	1.533	-.260	.795

GLMER analysis of true reciprocal and anti-causative verbs on the sample of four-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			.173	.418
Stimuli : Intercept			2.076	1.440
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	2.555	1.018	2.510	.012*
Trial Order	-.007	.041	-.184	.854
Verb Frequency	.575	.549	1.047	.295
Verb Length	-.507	.604	-.840	.401
Verb Type (anti-causative)	.282	1.376	.205	.837

Appendix 8c: GLMER analyses on the sample of five-year-olds

GLMER analysis of true and lexical reflexive verb production on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			0.122	0.098
Stimuli : Intercept			0.089	0.077
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reflexive)	21.429	432.333	.003	.997
Trial Order	.143	.120	1.187	.235
Verb Frequency	.191	.537	.357	.721
Verb Length	-.278	.329	-.845	.398
Verb Type (lexical reflexive)	-19.255	432.333	-.003	.998

GLMER analysis of true and lexical reciprocal verb production on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			3.280	1.811
Stimuli : Intercept			1.956	1.399
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	4.149	1.340	3.097	.001**
Trial Order	.063	.083	.756	.449
Verb Frequency	.156	.611	.256	.797
Verb Length	.565	.836	.676	.498
Verb Type (lexical reciprocal)	-1.086	1.526	-.702	.476

GLMER analysis of true reciprocal and anti-causative verbs on the sample of five-year-olds

Random effects			*Variance*	*SD*
Subject : Intercept			2.070	1.439
Stimuli : Intercept			3.116	1.765
Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (true reciprocal)	3.953	1.415	2.794	.005**
Trial Order	-.024	.057	-.435	.663
Verb Frequency	.514	.735	.699	.484
Verb Length	-.479	1.048	-.475	.647
Verb Type (anti-causative)	.301	1.923	.157	.875

Appendix 8d: GLMER analyses of verb types across groups

GLMER analysis of true reflexive verbs across groups

Random effects	*Variance*	*SD*
Subject : Intercept	0.000e+00	0.000e+00
Stimuli : Intercept	3.618e-12	1.902e-06

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	2.395	.469	5.100	.000***
Trial Order	-.016	.023	-.714	.475
Verb Frequency	-.104	.221	-.471	.637
Verb Length	-.349	.179	-1.961	.049*
Age (4-year-olds)	.879	.517	1.701	.089
Age (5-year-olds)	.692	.491	1.407	.159

GLMER analysis of true reflexive verbs across groups (relevel)

Random effects	*Variance*	*SD*
Subject : Intercept	6.705e-14	2.589e-07
Stimuli : Intercept	0.000e+00	0.000e+00

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	3.275	.587	5.575	2.48e-08***
Trial Order	-.016	.023	-.714	.475
Verb Frequency	-.104	.221	-.471	.637
Verb Length	-.349	.179	-1.961	.049*
Age (3-year-olds)	-.879	.517	-1.701	.089
Age (5-year-olds)	-.187	.576	-.326	.744

GLMER analysis of lexical reflexive verbs across groups

Random effects	*Variance*	*SD*
Subject : Intercept	9.228e-18	3.038e-09
Stimuli : Intercept	5.229e-17	7.231e-09

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	3.509e+00	1.180e+00	2.973	.002**
Trial Order	3.828e-02	6.088e-02	.629	.529
Verb Length	1.517e+00	7.648e-01	1.983	.047*
Verb Frequency	7.318e-01	6.766e-01	1.082	.279
Age (4-year-olds)	4.424e+01	6.126e+06	.002	.998
Age (5-year-olds)	3.414e+01	6.008e+06	.001	.999

GLMER analysis of lexical reflexive verbs across groups (relevel)

Random effects	*Variance*	*SD*
Subject : Intercept	9.228e-18	3.038e-09
Stimuli : Intercept	5.229e-17	7.231e-09

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	2.454e+01	1.695e+04	.001	.998
Trial Order	3.828e-02	6.088e-02	.629	.529
Verb Length	1.517e+00	7.648e-01	1.983	.047*
Verb Frequency	7.318e-01	6.766e-01	1.082	.279
Age (3-year-olds)	-2.103e+01	1.695e+04	-.001	.998
Age (5-year-olds)	9.520e+00	1.906e+06	-.002	.998

GLMER analysis of true reciprocal verbs across groups

Random effects	*Variance*	*SD*
Subject : Intercept	2.702e-06	.001
Stimuli : Intercept	3.295e+00	1.815

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	1.834	1.055	1.738	.082.
Trial Order	-.006	.020	-.305	.760
Verb Frequency	2.635	1.153	2.286	.022*
Verb Length	-3.332	1.306	-2.551	.010*
Age (4-year-olds)	2.399	.439	5.457	.000***
Age (5-year-olds)	2.939	.479	6.126	.000***

GLMER analysis of true reciprocal verbs across groups (relevel)

Random effects	*Variance*	*SD*
Subject : Intercept	.000	.000
Stimuli : Intercept	3.295	1.815

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	4.234	1.111	3.810	.000***
Trial Order	-.006	.020	-.305	.760
Verb Frequency	2.635	1.153	2.286	.022*
Verb Length	-3.332	1.306	-2.551	.010*
Age (3-year-olds)	-2.399	.439	-5.457	.000***
Age (5-year-olds)	.539	.467	1.154	.248

GLMER analysis of lexical reciprocal verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.564	.751
Stimuli : Intercept			.669	.818

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	.197	.518	.382	.703
Trial Order	-.009	.018	-.493	.622
Verb Frequency	.558	.471	1.185	.236
Verb Length	.658	.460	1.431	.152
Age (4-year-olds)	2.414	.393	6.132	.000***
Age (5-year-olds)	2.830	.445	6.355	.000***

GLMER analysis of lexical reciprocal verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.564	.751
Stimuli : Intercept			.669	.818

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	2.612	.592	4.408	1.04e-05***
Trial Order	-.009	.018	-.493	.622
Verb Frequency	.558	.471	1.185	.236
Verb Length	.658	.460	1.431	.152
Age (3-year-olds)	-2.414	.393	-6.132	.000***
Age (5-year-olds)	.415	.451	.920	.357

GLMER analysis of anti-causative verbs across groups

Random effects			*Variance*	*SD*
Subject : Intercept			.069	.264
Stimuli : Intercept			1.414	1.189

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (3-year-olds)	.277	.612	.454	.649
Trial Order	.066	.020	3.337	.000***
Verb Frequency	-.025	.533	-.047	.962
Verb Length	-.093	.293	-.318	.750
Age (4-year-olds)	1.010	.369	2.731	.006**
Age (5-year-olds)	1.434	.405	3.538	.000***

GLMER analysis of anti-causative verbs across groups (relevel)

Random effects			*Variance*	*SD*
Subject : Intercept			.069	.264
Stimuli : Intercept			1.414	1.189

Fixed effects	*Estimate*	*SE*	*z-value*	*p-value*
Intercept (4-year-olds)	1.287	.627	2.054	.039*
Trial Order	.066	.020	3.337	.000***
Verb Frequency	-.025	.533	-.047	.962
Verb Length	-.093	.293	-.318	.750
Age (3-year-olds)	-1.010	.369	-2.731	.006**
Age (5-year-olds)	.424	.425	.998	.318

Appendix 9: Complete verb production per verb type in the main and follow-up experiment

Appendix 9a: Three-year-olds

Verb type / Child	True reflexive		Lexical reflexive		True reciprocal		Lexical reciprocal		Anti-causative	
	first	follow-up	first	follow-up	first	follow-up	first	follow-up	first	follow-up
MAG 31	4	3	6	6	2	3	0	0	4	4
ANJA 33	6	6	5	6	4	4	2	5	2	6
SAR 35	5	5	4	6	3	3	0	0	0	4
IVA 35	4	5	4	6	3	3	2	2	1	2
NIN 36	6	6	6	6	3	3	1	4	1	3
KSE/NIN36	6	5	6	6	2	4	1	1	3	5
SAR 37	6	5	4	5	3	4	0	4	1	3
VANJ 37	5	6	6	6	2	4	1	5	5	3
MIL 37	4	6	5	6	2	4	0	2	3	5
MAR 38	5	5	5	5	2	3	0	0	3	5
SER 38	6	6	6	6	4	5	3	3	4	5
MIH 38	5	6	6	5	3	3	3	3	2	5
ALE 39	2	5	5	6	3	4	0	2	0	3
LAZ 40	2	5	4	5	2	3	3	5	5	6
JAN 40	6	6	6	6	3	5	1	2	3	4
ANA 40	6	6	6	6	3	3	2	4	0	4
NAT 41	6	6	6	6	3	3	3	4	3	6
PET 41	2	5	4	6	2	4	2	4	3	5
BOG 41	3	4	5	6	2	2	1	3	2	3
ALE 42	5	6	6	6	3	6	4	6	5	6

Appendix 9b: Four-year-olds

Verb type / Child	True reflexive		Lexical reflexive		True reciprocal		Lexical reciprocal		Anti-causative	
	first	follow-up	first	follow-up	first	follow-up	first	follow-up	first	follow-up
VUK 43	6	6	6	6	3	5	3	5	3	4
MILJ 47	5	4	5	6	3	5	3	4	3	5
KAT 48	6	5	6	6	5	4	5	5	5	6
DUN 48	6	6	5	6	3	6	3	5	1	4
NIN 49	6	5	6	6	3	4	1	3	5	5
DIJ 49	6	6	6	6	4	3	3	6	3	5
VELJ 49	5	6	6	6	5	4	4	6	3	5
NIN 49	6	6	6	6	3	6	4	5	5	3
RELJ 50	3	6	6	6	3	6	4	6	5	6
MIJ 51	3	4	6	6	3	5	4	4	2	5
KOS 51	5	6	5	6	3	6	3	5	4	6
STA 51	6	6	6	6	5	6	4	6	4	6
HAN 51	6	6	6	6	6	5	6	5	5	6
LEN 53	6	6	6	6	5	6	6	6	2	5
LUK 54	6	6	6	6	4	6	5	5	5	6
MAR 54	4	6	6	6	4	5	2	5	4	5
TEO 54	6	6	6	6	5	6	6	6	5	5
DAN 54	6	6	6	6	4	6	6	5	5	6
LED 54	6	6	6	6	6	6	6	6	4	4
TIJ 54	6	6	6	6	4	5	5	6	5	5

Appendix 9c: Four-year-olds

Verb type / Child	True reflexive		Lexical reflexive		True reciprocal		Lexical reciprocal		Anti-causative	
	first	follow-up	first	follow-up	first	follow-up	first	follow-up	first	follow-up
MEJ 56	6	5	6	6	4	5	3	6	3	5
JAN 56	5	6	6	6	5	5	5	5	4	4
MAR 56	5	6	6	6	6	6	4	6	4	5
MIH 57	6	5	6	6	4	4	4	5	3	5
NAT 58	6	6	6	6	3	6	3	5	6	6
KAT 58	6	6	6	6	5	6	5	6	6	6
VIK 58	4	5	6	6	6	6	6	6	6	6
LEN 59	5	6	6	6	4	6	6	6	6	6
NIN 60	5	4	6	6	5	5	4	3	5	4
ANA 61	6	5	6	6	5	6	5	6	5	6
NJEG 62	6	6	6	6	4	4	5	3	5	6
VIK 64	4	6	6	6	6	6	5	6	4	6
VUK 64	5	6	6	6	5	5	6	6	4	6
BAL 64	6	6	6	6	5	6	4	6	4	6
AJA 64	6	6	5	6	5	6	6	6	3	4
LAZ 65	6	6	6	6	6	6	4	6	4	6
NIK 65	6	6	6	6	6	6	5	4	5	5
MIH 68	6	5	6	6	5	6	6	6	5	5
LJUB 68	6	6	6	6	5	6	6	6	5	6
JOV 68	5	6	6	6	4	4	5	6	5	4

Appendix 10: Non-target answers in the repeated experiment

Appendix 10a: Non-target answers for true reflexive verbs across groups

Non-target answers		Group 1	Group 2	Group 3
Non-target verbs	*oblačiti se* 'dress'	*on drži majicu* he.nom hold.3sg.pres T-shirt. acc 'he is holding a T-shirt'	/	/
	šminkati se 'put on make-up'	*sa labelom se ona farba* with lip balm.inst SE she.nom paint.3sg.pres 'she is painting herself with lip balm' *farba se* paint.3sg.pres SE 'she is painting herself'	/	*ona koristi lak za usta* she.nom use.3sg.pres polish.acc for lips.acc 'she is using lip polish'
Transitive variants		*(o)briše usta* (2x) dry.3sg.pres mouth.acc 'she dries/is drying her mouth' *briše lice* dry.3sg.pres face.acc 'she is drying her face' *obuče jaknu* put on.3sg.pres jacket.acc 'he puts on a jacket' *češlja kosu* comb.3sg.pres hair.acc 'she is combing her hair' *umiva lice* wash.3sg.pres face.acc 'he is washing his face' *obuče/stavlja majicu* put on.3sg.pres T-shirt.acc 'he is putting on a T-shirt' *crta usne* paint.3sg.pres lips.acc 'she is painting her lips'	*stavlja/pravi šminku* put on/make.3sg.pres make-up.acc 'she is putting on/making make-up' *briše lice* dry.3sg.pres face.acc 'she is drying her face' *briše peškir* dry.3sg.pres towel.acc 'she is drying a towel' *češlja kosu* comb.3sg.pres hair.acc 'she is combing her hair'	*obriše usta* dry.3sg.pres mouth.acc 'she dries her mouth' *šminka usta* put on make-up.3sg.pres lips.acc 'she is putting on lipstick' *češlja/četka kosu* comb/brush.3sg.pres hair.acc 'she is combing/brushing her hair' *sad je obrisala sebe* now.adv dry.3sg.past herself.acc 'now she dried herself' *oblači majicu* put on.3sg.pres T-shirt.acc 'he is putting on a T-shirt'
Made-up verbs		*se spušta* SE put down.3sg.pres instead of *oblači se*	/	/

	‘he is dressing’		
Other	/	pa se onda češljala kosu so SE then.adv comb.3sg.past hair.acc	/

Appendix 10b: Non-target answers for true reciprocal verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
	juriti se 'chase each other'	*igraju se jurke* play.3pl.pres SE chasing.gen 'they are playing chasing' *oni igraju šuge* they.nom play.3pl.pres tag.gen 'they are playing tag' *trče i oni beže* run.3pl.pres and they.nom run away.3pl.pres 'they are running and they are running away' *trče(ju) x8* run.3pl.pres 'they are running' *beže (od njega/dečaka) x3* run away.3pl.pres from him/boy.gen 'they are running away from him/the boy'	*jurcaju* run around.3pl.pres 'they are running around' *igraju se vije/jurke x5* play.3pl.pres SE chasing.gen 'they are playing chasing' *trče* run.3pl.pres 'they are running' *igraju se koga uhvatiš on onda bude* play.3pl.pres SE whom catch.2sg.pres he.nom then be.3sg.pres 'they are playing the one you catch plays next'	*igraju se šuge/vije x5* play.3pl.pres SE tag/chasing.gen 'they are playing tag/chasing'
	gađati se 'throw something at each other'	*bacaju x2* throw.3pl.pres 'they are throwing' *onda tako oni bacaju* then.adv like that.adv they.nom throw.3pl.pres 'then they are throwing like that' *tuku se (sa jastucima) x4* fight.3pl.pres SE with pillows.inst 'they are fighting (with pillows)' *bacaju jastuk jedno na drugog* throw.3pl.pres pillows.acc one at another 'they are throwing pillows at each other' *bacaju ih x2* throw.3sg.pres them 'they are throwing them'	*udaraju/lupaju se s jastucima(jastukama)* hit.3pl.pres.SE with pillows.inst 'they are hitting each other with pillows' *tuku se* fight.3pl.pres SE 'they are fighting'	*lupaju se s jastukima* hit.3pl.pres.SE with pillows.inst 'they are hitting each other with pillows' *igraju se tuče jastuka* play.3pl.pres SE fight.gen pillows.gen 'they are playing pillow fight'

		igraju se tuče jastucima play.3pl.pres SE fight.gen pillows.inst 'they are playing pillow fight' *bacaju jastuke* throw.3pl.pres pillows.acc 'they are throwing pillows'		
	gledati se 'look at each other'	*pričaju* talk.3pl.pres 'they are talking' *oni radu da se zagrliju*[35] they.nom do that SE hug.3pl.pres 'they do that they hug each other' *oni se grle* they.nom SE hug.3pl.pres 'they are hugging each other' *dogovaraju se* make a deal.3pl.pres SE 'they are making a deal' oni se kao ljube they.nom SE like kiss.3pl.pres 'they are like kissing' *maskiraju se* disguise.3pl.pres SE 'they are disguising themselves'	/	/
Verbs with full complements		*gledaju jedan u drugog/jedno u drugo* look.3pl.pres one at another 'they are looking at each other' *juri i juri i uhvati* chase.3sg.pres and chase.3sg.pres and catch.3sg.pres 'he is chasing and chasing and catches' *trči i vija* run.3sg.pres and chase.3sg.pres 'he is running and chasing' *brat gleda u nju* brother.nom look.3sg.pres at her *a seka gleda u njega*	*gađaju jednog u drugog* throw.3pl.pres one at another.acc 'they are throwing something at each other' *bata gleda u njega* brother.nom look.3sg.pres at him *a seka gleda u njega* and sister.nom look.3sg.pres at him 'thebrother is looking at him and the sister is looking at him' *on gleda nju* he.nom look.3sg.pres her.acc *ona gleda njega* she.nom look.3sg.pres him.acc	*gledaju jedan drugog/jedno u drugog* look.3pl.pres one at another 'they are looking at each other'

[35] These verb forms are incorrect. The correct 3rd person plural present forms are *rade* and *zagrle.*

	and sister.nom look.3sg.pres at him.acc 'the brother is looking at her and the sister is looking at him' *ona gleda u njega* she.nom look.3sg.pres at him *a on gleda u nju* and he.nom look.3sg.pres at her 'she is looking at him and he is looking at her' *gledaju crteže* look.3pl.pres drawings.acc 'they are looking at drawings'	'he is looking at her she is looking at him'	
Made-up verbs	*bacaju se* 'throw.3pl.pres SE' instead of *gađaju se* 'they are throwing something at each other' *se zaljubljaju*[36] SE fall in love.3pl.pres instead of *ljube se* 'they are kissing each other'	/	*se bacaju jastucima* 'SE throw.3pl.pres pillows.inst' instead of *gađaju se* 'they are throwing something at each other'
Other	/	*gledaju se jedno drugo* look.3pl.pres SE one another 'they are looking SE at each other'	/
No answer	6	/	/

[36] This verb form is incorrect. The correct 3rd person plural form of the verb *zaljubiti se* 'fall in love' would be *zaljube*.

Appendix 10c: Non-target answers for lexical reciprocal verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	*svađati se* 'argue'	*viče* yell.3sg.pres 'he is yelling' *viču/vikaju*[37] yell.3pl.pres 'they are yelling' *se udare* SE hit.3pl.pres 'they hit each other' *oni se ljute* they.nom SE angry.3pl.pres 'the boys are angry' *galame* make noise.3pl.pres 'they are making noise' *oni pričaju da će uzeti prvi on ili drugi* they.nom talk.3pl.pres DA will take.3sg.pres first he or second 'they are talking that he will take first or second'	*otimaju se* fight over.3pl.pres SE 'they are fighting over it'	*se dovikuju* SE yell.3pl.pres 'they are yelling to each other' *ružno pričaju* uglily.adv talk.3pl.pres 'they are talking in an ugly way' *otimaju se* fight over.3pl.pres SE 'they are fighting over it'
	trkati se 'race'	*trče(ju)* x12 run.3pl.pres 'they are running' *hoće da pobede* want.3pl.pres to win.3pl.pres 'they want to win'	*trče x6* run.3pl.pres 'they are running'	*trče* x2 run.3pl.pres 'they are running'
	mačevati se/boriti se 'fence/fight'	*mačevima se tuku* sword.inst SE fight.3pl.pres 'they are fighting with swords' *tučaju/tuku se (sa mačeva/ima)*[38] fight.3pl.pres SE (with sword.inst) 'they are fighting each other with	/	/

[37] This verb form is incorrect. The correct 3rd person plural verb form is *viču*.
[38] The forms in this verb phrase are incorrect. The correct forms are *tuku* and *mačevima*.

		swords' *mačevi se igraju* swords.nom SE play.3pl.pres 'swords are playing' *jedna drugom se udaraju se sa mačevima* one another SE hit.3pl.pres SE with swords.inst 'one another are hitting each other with swords' *se igraju mačom* SE play.3pl.pres sword.inst 'they are playing with swords' *sudaraju se sa mačom* collide.3pl.pres SE with sword.inst 'they are colliding with sword'		
	rukovati se 'shake hands'	*pozdravljaju se* x5 say hello.3pl.pres SE 'they are saying hello to each other' *oni se čestitaju* they.nom SE congratulate.3pl.pres 'they congratulate' *pomire se* make up.3pl.pres SE 'they make up' *oni tako se pozdraviju*[39] they.nom like that.adv SE say hello.3pl.pres 'they say hello like that' *oni su imali rođendan* they.nom have.3pl.past birthday.acc 'they had birthday' *druže se* hang out.3pl.pres SE 'they are hanging out' *pozdrave se* say hello.3pl.pres SE 'they say hello'	*pozdravljaju se* x6 say hello.3pl.pres SE 'they are saying hello to each other'	*pozdravljaju se (rukom ovako)* x3 say hello.3pl.pres SE hand.inst like this.adv 'they are saying hello to each other with their hands like this' *dodiruju se sa rukama* touch.3pl.pres SE with hands.inst 'they are touching each other with hands' *drže se za ruke* hold.3pl.pres SE for hands.acc 'they are holding each other's hand'

[39] This verb form is incorrect. The correct verb form would be *pozdrave*, not *pozdraviju*.

	dobacivati se 'throw a ball at each other'	*igraju *loptu* play.3pl.pres ball.acc 'they are playing ball' *bacaju loptu* x3 throw.3pl.pres ball.acc 'they are throwing the ball' *igraju se dobacive* play.3pl.pres SE 'they are playing ball throwing' *se igraju lopticom* SE play.3pl.pres ball.inst 'they are playing ball with a ball'	*igraju odbojku* play.3pl.pres volleyball.acc 'they are playing volleyball'	/
	sudariti se 'collide'	*oni su se udarili autama*[40] they.nom SE hit.3pl.past with cars.inst 'they hit each other with their cars' *udarili su se* hit.3pl.past SE 'they hit each other' *oni su se ljutili* they.nom SE angry.3pl.past 'they were angry' *udarilo se* hit.3sg.past SE 'it hit itself' *udarila se dva dečaka* hit.3pl.past SE two boys.nom 'two boys hit each other' *udare se jedno u drugo* hit.3pl.past SE one into another 'they hit into each other'	/	*udarili su se* hit.3pl.past SE 'they hit each other'
Made-up verbs		*bacaju se sa dvoje* 'throw.3pl.pres SE with two' instead of *dobacuju se* 'they are throwing a ball at each other' *se cuknuli* instead of *sudarili su se* 'they collided'	*bacaju se sa loptom* 'throw.3pl.pres SE with ball.inst' instead of *dobacuju se* 'they are throwing a ball at each other'	/
Nouns		*zdravo/pozdrav*	/	/

[40] This noun form is incorrect. The correct form of instrumental is *autima*, not *autama*.

	‘hello’ instead of *rukovati se* ‘shake hands’ *dobar dan.acc* ‘good day’ instead of *rukovati se* ‘shake hands’		
Other	/	*sa rukom rade ovako* with hand.inst do.3pl.pres like this.adv ‘they do like this with their hand’ instead of *rukovati se* ‘shake hands’	/
No answer	6	/	/

Appendix 10d: Non-target answers for anti-causative verbs across groups

Non-target answers		three-year-olds	four-year-olds	five-year-olds
Non-target verbs	open ‘otvoriti se’	*kapija se polomila* gate.nom SE break.3sg.fem ‘the gate broke’	/	/
	zatvoriti se ‘close’	*nije moglo da se otvori* not can.3sg.neut.past DA SE open.3sg.pres ‘it could not be opened’ *pokvarila su se* stop working.3pl SE ‘it stopped working’	*onda su ova zatvorena i* then.adv are these closed.fem.adj and *ne mogu da se otvore* not can.3pl.pres DA SE open.3pl.pres ‘then these are closed and they cannot be opened’ *vrata se nisu otvorila* door.nom SE not open.3sg.fem ‘the door did not open’	*ne mogu da se otvore* not can.3pl.pres DA SE open.3pl.pres ‘they cannot be opened’
	upaliti se ‘turn on’	*tu se nije pokvarilo* here SE not stop working.3sg.neut ‘it didn’t stop working there’ *ovaj se zapalio* this SE ignite.3sg.masc ‘this ignited’ *može da se upali* can.3sg.pres DA SE turn on.3sg.pres ‘it can be turned on’ *ponovo je radilo* again.adv work.3sg.neut.past ‘it worked again’	*sija* glow.3sg.pres ‘it glows’ *svetli* shine.3sg.pres ‘it shines’	*sija* glow.3sg.pres ‘it glows’
	ugasiti se ‘go out’	*ne radi* not work.3sg.pres ‘it is not working’ *pukla je i nije više gorela* crack.3sg.fem.past and not anymore.adv burn.3sg.fem.past ‘it cracked and did not burn anymore’ *istopila se* melt.3sg.fem SE ‘it melted’ *ona se pokvarila* she.nom SE stop working.3sg.fem	*tu se izduvala* here.adv SE blow out.3sg.fem ‘here it blew out’ *oduvao je* blow.3sg.masc.past it.acc ‘he blew it’ *izduvala se* blow out.3sg.fem SE ‘it blew out’	*ne gori* not burn.3sg.pres ‘it isn’t burning’ *ta svećica je neko dunuo* that candle.nom is someone.nom blow.3sg.masc.past *i više nije upaljena nego je zagašena* and more not is turned on.fem.adj but is gone out.fem.adj ‘that candle someone blew and it is no longer burning but is gone out’ *se isključila*

		‘it stopped working’ *isključio se* turn off.3sg.masc SE ‘it turned off’ *pokvarila se* stop working.3sg.fem SE ‘it stopped working’ *neko je izduvao* someone.nom blow.3sg.masc.past ‘someone blew it’ *neko je oduvao* someone.nom blow.3sg.masc.past ‘someone blew it’ *izduvala se* blow out.3sg.fem SE ‘it blew out’ *izduvao ovako* blow.3sg.masc like this.adv ‘he blew like this’ *oduvali su je* blow.3pl.masc.past it.acc ‘they blew it’		turn off.3sg.fem SE ‘it turned off’
	pokvariti se ‘stop working’	*on se raspao* he.nom SE fall apart.3sg.masc ‘it fell apart’	/	/
	polomiti se ‘break’	*prosula se na sto* spill.3sg.fem SE on table.acc ‘it spilt on the table’ *puknula* crack.3sg.fem ‘cracked’ *onda se sve pocepalo* then.adv SE all tear.3sg.neut ‘then it all tore’	*pukla je* crack.3sg.fem.past ‘it cracked’	/
Verbs with implicit Agents		*možeš da upališ svetlo* can.2sg.pres to turn on.2sg.pres	/	*ugasio je neko* extinguish.3sg.masc.past

	light.acc 'you can turn on the light' *onda je došao vuk i upalio svetlo* then.adv come.3sg.past wolf.nom and turn on.3sg.past light.acc 'then came the wolf and turned on the light' *neko je srušio* someone.nom knock down.3sg.past 'someone knocked it down' *onda su stalno ugasili i upalili* then.adv always.adv turn off.3pl.past and turn on.3pl.past 'then they turned it on and off all the time' *auto je otvorio* car.nom open.3sg.past 'the car opened it' *slavljenik je ugasio svećicu* host.nom extinguish.3sg.masc.past candle.acc 'the host extinguished the candle'		someone.nom 'someone extinguished it'
Made-up verbs	*oduvala se (sama)* x2 blow.3sg.fem SE (alone) 'it blew out alone'	/	*oduvala se x2* blow.3sg.fem SE 'it blew out'
Other	*vrata otvorena i zatvorena* door.nom open.fem.adj and closed.fem.adj 'door open and closed' *otvorena je* open.fem.adj is 'it is opened' *su bila zatvorena* were closed.fem.adj 'were closed'	*pali gasi* 'turn on turn off' *je oduvana* is blown.fem.adj 'is blown out' *zaključana su (2x)* locked.fem.adj are 'are locked' *svećica je ugašena (2x)* candle.nom is gone out.fem.adj 'the candle is gone out' *(vrata) su zatvorena (2x)* door.nom are closed.fem.adj 'the doors are closed' *upaljeno (2x)*	*svećica je ugašena* x2 candle.nom is gone out.fem.adj 'the candle is gone out' *ona je oduvana* she.nom is blown.fem.adj 'it is blown out' *robot je pokvaren* robot.nom is broken.masc.adj 'robot is broken' *je upaljeno* is turned on.neut.adj 'is turned on'

		turned on.neut.adj ‘turned on’	