THE ASSESSMENT OF CLITIC PRODUCTION IN SERBIAN SPEAKERS

Mile Vuković[*], Ljiljana Simić, Lana Jerkić Rajić

[1]University of Belgrade, Faculty of Special Education and Rehabilitation,
Belgrade, Serbia
[2]Center Terapika, Belgrade, Serbia
[3]Health Center, Niš, Serbia

ORCID iDs: Mile Vuković https://orcid.org/0000-0003-3750-7991
Ljiljana Simić https://orcid.org/0009-0004-9440-6729
Lana Jerkić Rajić https://orcid.org/0000-0003-2086-9232

Abstract

This study examines clitic production in adult, neurologically healthy speakers of Serbian. The primary aim was to assess the validity and reliability of the newly developed Clitic Production Test, as well as to explore regional differences in clitic usage across various Serbian-speaking areas. A secondary goal was to investigate the influence of socio¬demographic factors — including gender, age, level of education, and place of residence — on clitic production. The sample included 250 participants from five distinct regions (50 per region). A retest was conducted on a subsample of 100 participants, proportionally representing all regions. In addition to the Clitic Production Test, sentence repetition and digit span tasks were administered to assess short-term verbal and working memory. Findings indicate that the Clitic Production Test demonstrates strong psychometric properties, including internal consistency, test–retest reliability, and both intra- and inter-rater reliability. The test also shows good construct validity. Educational attainment emerged as a significant predictor of clitic production, particularly for enclitics: participants with higher levels of formal education produced clitics more frequently than those with less education. Statistically significant regional differences in clitic production were also found, especially when assessed according to prescriptive grammatical norms. Furthermore, a strong correlation was observed between clitic production and digit span performance, suggesting that both short-term and working memory capacities are associated with clitic usage. In conclusion, Serbian speakers demonstrate a high degree of clitic production, with clear variation influenced by both regional background and educational level.

Key words: clitics, enclitics, proclitics, Serbian language, Clitic Production Test.

[*] Corresponding author: Mile Vuković, PhD Student, University of Belgrade, Faculty of Special Education and Rehabilitation, Visokog Stevana 2, 11158 Belgrade, Serbia, mvukovic@fasper.bg.ac.rs

ПРОЦЕНА ПРОДУКЦИЈЕ КЛИТИКА КОД ГОВОРНИКА СРПСКОГ ЈЕЗИКА

Апстракт

У раду је извршена процена продукције клитика код одраслих, неуролошки здравих говорника српског језика. Циљ је био да испитамо ваљаност и поузданост Теста продукције клитика, као и да утврдимо разлике у продукцији клитика између испитаника различитих региона српског говорног подручја. Такође, желели смо да испитамо утицај социодемографских варијабли (пол, године старости, дужина образовања, пребивалиште) на продукцију клитика. У истраживању је учествовало 250 испитаника из пет региона српског говорног подручја, по 50 испитаника из сваког. Поновљено тестирање је извршено на подузорку од 100 испитаника, процентуално подједнако заступљених из сваког региона. У истраживању је примењен нови тест за процену продукције клитика у српском језику. Ради испитивања повезаности продукције клитика са краткорочним вербалним памћењем и радном меморијом, примењени су тестови понављања реченица и понављања бројева. Резултати су показали да Тест продукције клитика испуњава критеријуме различитих типова поузданости (интерна конзистентност, временска стабилност теста, поузданост поновљеног оцењивања од истог испитивача и поузданост оцењивања у односу на различите испитиваче), као и да има добру конструктивну ваљаност. Показано је да године образовања утичу на продукцију клитика, а нарочито енклитика. Прецизније, особе са већим нивоом образовања продукују више клитика у поређењу са особама са краћим формалним образовањем. Такође, уочена је значајна разлика у продукцији клитика између испитаника из различитих региона српског говорног подручја, када се у оцењивању поштују прескриптивна граматичка правила. Најзад, уочена је значајна повезаност продукције клитика са способношћу понављања бројева (краткорочном и радном меморијом). Закључено је да српски говорници у значајној мери продукују клитике, те да ниво продукованих клитика зависи од региона и нивоа образовања испитаника.

Кључне речи: клитике, енклитике, проклитике, српски језик, Тест продукције клитика.

INTRODUCTION

Serbian belongs to the group of South Slavic languages of the Western type. The Shtokavian supradialect, which includes Ekavian and Ijekavian pronunciations, is the basis of the Serbian language (Stanojčić & Popović, 2014). The pronunciations are divided into dialects that have specific grammatical features. Depending on the development of accents and forms, they are divided into Old Shtokavian and New Shtokavian dialects. The regions with Ekavian pronunciation are Šumadija–Vojvodina (neo-Shtokavian), Kosovo–Resava and Prizren–Timok (Old Shtokavian). The Ijekavian pronunciation is used in the region of East Herzegovina (Neo-Shtokavian) and Zeta–South Sandžak (Old Shtokavian) (Stanojčić & Popović, 2014).

In morphology and syntax, a clitic (/ˈklɪtɪk/), derived from the Greek word ἐγκλιτικός meaning 'leaning' or 'enclitic,' represents a morpheme that has the syntactic features of a word, but is phonologically dependent on another word or phrase. In this sense, a clitic is syntactically independent, but phonologically dependent – it is always bound to a host. Clitics are pronounced like affixes, but play a syntactic role at the phrase level. In other words, clitics have the form of affixes but the distribution of function words. For example, in English, the contracted forms of auxiliary verbs in sentences such as "he*'s*" and "they*'ll*" represent clitics.

From a syntactic point of view, clitics are regarded as syntactic constituents, as they interact syntactically with other words at sentence or phrase level. These are usually function words. From a prosodic point of view, however, they lack independence and accent, which makes them components of other accented words. In addition, clitics represent a hybrid category, as they have some characteristics of real words and grammatical affixes, but cannot be classified into either of these categories (Božović, 2021). From a semantic point of view, clitics represent grammatical function words that fulfil various structural functions (e.g. express inflectional meanings, convey information about the discourse, etc.) (Milićević, 2023).

Clitics can belong to any grammatical category, although they are usually pronouns, determiners or adpositions. Note that spelling is not always a good guide for distinguishing clitics from affixes: clitics can be written as separate words, but sometimes they are joined to the word they depend on (like the Latin clitic -que, meaning 'and') or separated by special characters such as hyphens or apostrophes (like the English clitic *'s* in "it*'s*" for "it has" or "it is").

Clitics are words that have no accent, but form an accented and pronounced unit with words behind or in front of them. Considering their position in relation to the stressed word, they are classified as proclitics or enclitics. Proclitics (prepositions, conjunctions and the negative particle *ne*) form an accented unit with words behind them, while enclitics form an accented unit with words in front of them. In Serbian, enclitics can be pronouns (unstressed forms of personal pronouns for the genitive and accusative singular and plural: *me, te, ga, je, ju, nas, vas, ih*; dative singular and plural: *mi, ti, mu, joj, nam, vam, im*) and verbs (unstressed forms of auxiliary verbs, i.e. shorter forms of the present tense of the verb *to be (biti): sam, si, je, smo, ste, su,* and the verb *want (hteti): ću, ćeš, će, ćemo, ćete, će* mostly as part of the complex form of the future tense; aorist of the verb *to be (biti)* as part of the potential: *bih, bi, bismo, biste*), the interrogative word *li*, and the reflexive pronoun *se* (Piper et al, 2005; Stanojčić & Popović, 2014; Subotić et al., 2012). In Serbian sentences containing pronouns and/or auxiliaries, the speaker must decide whether to use stressed, full word forms or unstressed, clitic forms. Unstressed

clitic forms are most often used in neutral communicative situations (when there is no contrast and no stress - e.g. "She looked at me fixed-ly/Gledala *me je* netremice") and when certain syntactic or prosodic factors do not require the production of the full form (presence of a contrast: e.g. "Anyway, she did recognise him/Bilo kako bilo, prepoznala ga *jeste*" or "She was not looking at him but at me/Nije gledala *njega* već *mene*") (Milićević, 2023).

The Serbian language allows the accumulation of clitics, but only in a certain order (e.g. "That poet wrote me a poem/Taj pesnik *mi je* napisao pesmu"). When free words change place (e.g. "That poet wrote a poem for me/Taj *mi je* pesnik napisao pesmu"), it can be seen that the clitic cluster is inserted into the noun phrase, but the order of the clitic cluster remains unchanged (Spencer & Luís, 2012). In addition, enclitics must follow the principle of post-initial, second position (after the first constituent), as they require the presence of a host (any syntactic constituent), although the order of words in Serbian is relatively free (Božović, 2021; Spencer & Luís, 2012). Also, the final position is not desirable for enclitics and is mainly constrained by the syntactic structure of the clause (Božović, 2021).

Based on the assumption that some cognitive functions have an influence on the production of clitics (Grueter & Crago, 2012; Smolík & Vávru, 2014; Stanford et al., 2019), a number of studies in various languages have been carried out to determine the degree and extent of this influence. Specifically, the relationship between certain cognitive processes and syntactic abilities has been investigated. More specifically, the object of study has mainly involved short-term and working memory tasks (digit span tasks, sentence repetition, etc.) with the aim of determining the relationship between these skills in children with developmental language disorder (DLD) and children with typical language development (TLD). One such study showed that Czech children with DLD have the greatest difficulties in repeating verbs and clitics in sentence repetition tasks (Smolík & Vávru, 2014). We also mention a study conducted on French-speaking children that aimed to assess the impact of working memory training on the production of 3rd person accusative clitic pronouns in children with TLD and DLD[1]. The results of that study showed that after 12 weeks of working-memory training, there was an improvement in syntactic skills that were not directly treated (Stanford et al., 2019). On the other hand, we find data on the negative association of working memory with the acquisition of object clitics in children learning French as a second language (Grueter & Crago, 2012). To the best of our

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[1] The French language is characteristically difficult for children with language disorders to master

knowledge, no studies concerning the relationship between the production of clitics and working and short-term memories have been carried out for Serbian speakers.

RESEARCH OBJECTIVES

Considering the grammatical (morphosyntactic) complexity of the Serbian language and the peculiarities of its different dialects, as well as the importance of the knowledge of grammatical rules (prescriptive and descriptive), this study investigated the production of clitics in neurologically healthy adults, without data on the presence of language development disorders.

Our first aim is to determine the validity and reliability of the Clitic Production Test in Serbian speakers. The second aim is to investigate whether there are significant differences in the production of clitics between participants from different regions of the Serbian language area when performance is assessed according to the grammatical rules of standard language/prescriptive rules.

As a third aim, we set out to investigate the influence of different socio-demographic variables (gender, age, length of education, place of residence) on the use of clitics in the Serbian language.

Considering that literature data suggest a possible relationship between clitic production and short-term and working memory in the paediatric population, we thought it would be useful to investigate the relationship between these abilities in adult speakers of Serbian, which is the fourth aim of this study.

METHODS

Sample

The participants from different statistical regions of Serbia and participants from Republika Srpska were selected using a random sampling method. The testing was conducted in person by three trained researchers, proficient in both standard Ekavian and Ijekavian pronunciation, who also read sentences (test items) to the participants. Only participants who were born and raised in the selected dialectal region were included.

In the first test, the sample comprised a total of 250 respondents who spoke the Serbian language, 50 native speakers of the Ekavian pronunciation from each statistical region of Serbia (Šumadija and Western Serbia, Belgrade, Southern and Eastern Serbia and Vojvodina) and 50 native speakers of the Ijekavian pronunciation from Republika Srpska. The test included 105 (42%) men and 145 (58%) women. The retest subsample comprised 100 participants from the total sample – 20 participants (20%) from each region, 42 men and 58 women. Using the $\chi2$ independ-

ence test, no statistically significant difference was found in the distribution of male and female participants with respect to region of residence (χ^2 = 1.806, *df* = 4, p = .771). In addition, no statistically significant difference was found in age (χ^2 = 6.337, *df* = 4, *p* = .175) and duration of education (χ^2 = .396, *df* = 4, *p* = .420) in relation to the participants' region of residence. Participants had a mean age of 36.63 years (*SD* = 11.87, *Min* = 18, *Max* = 67) at the first testing, with a mean duration of education of 14.54 years (*SD* = 2.46, *Min* = 8, *Max* = 22). Similarly, at the retest, the mean age was 34.28 years (*SD* = 11.23, *Min* = 18, *Max* = 67), with a mean education duration of 15.14 years (*SD* = 2.14, *Min* = 8, *Max* = 22).

All respondents were informed about the purpose of the data collection and agreed to participate in the study voluntarily.

Instruments

Clitic Production Test. A newly constructed Clitic Production Test - CPT (Vuković, 2019) was used in the study, which was originally developed for clinical use to assess language in people with speech and language disorders. The test comprises 30 items and two practice items. The practice items aim to assess whether the participants understand what is expected of them during the test. The test items are divided into two subtests. The first subtest contains 18 items and is designed to assess the production of enclitics, while the second subtest contains 12 items and is designed to assess the production of proclitics. The participant is awarded one point for each correct answer or target clitic produced. If a test item requires the production of two target clitics and the participant produces only one, the answer is assessed as incomplete and awarded 0.5 points. Answers in which insufficient or omitted clitics are produced are awarded 0 points. The maximum possible score in the test is 30 points.

Sentence Repetition Test (for short-term memory assessment). For the purposes of this research, 12 sentences were selected from the Serbian version of the Boston Diagnostic Aphasia Examination (Vuković, 2015). The selected sentences vary in length between three and nine words. Before beginning the sentence repetition test, two sentences were read to the participants to ensure that they understood what was being asked of them. Each correctly repeated sentence is awarded one point, so that the participant can achieve a maximum of 12 points in this test.

The Number Repetition Test was specially developed for the purpose of this study. This kind of test is one of the most popular tools for the assessment of short-term and working memory. The test consists of two parts: (1) repeating numbers forward, and (2) repeating numbers backwards. In the first part of the test, which assesses short-term memory, the respondent is asked to repeat the numbers read out by the examiner in the same order. First, a sequence of two digits is repeated, which is then gradually expanded to a nine digits sequence. In the second part of the

test, which assesses working memory, the examiner reads out a series of numbers and the subject is asked to repeat the numbers in reverse order (e.g.: If the examiner reads out the numbers 7-3, the subject is asked to repeat 3-7). This task also begins with the repetition of a sequence of two digits and gradually increases to a sequence of eight digits. The respondent receives 1 point for each correctly repeated sequence. The first part of the test contains eight items and the second part contains seven, so that the maximum score for this test is 15 points.

Before the test begins, the examiner reads out two practice exercises - one for repeating numbers forwards and one for repeating numbers backwards.

Data Processing

Data processing was carried out using the SPSS program (Statistical Package for Social Sciences for Windows, version 23.0). Descriptive methods (frequency, percentage, mean, standard deviation, range in the format minimum-maximum, median, interquartile range) and non-parametric statistics (Spearman's rank correlation, the Mann-Whitney U-test, the Kruskal-Wallis test) were used. The results are presented here in tabular and textual form.

RESULTS

The results show that the average performance on the Enclitic subtest on the first testing was 14.78 (SD = 2.05), followed by 10.67 (SD = 1.08) on the Proclitic subtest. The average total score for the Clitic production test is 25.45 (SD = 2.65).

The average performance on the Enclitic subtest on the retest is 15.66 (SD = 1.71), and 11.17 (SD = .84) on the Proclitic subtest. The average total score on the Clitics Production Test on the retest was 26.82 (SD = 2.25).

Enclitic Subtest

The distribution of the participants' performance in the Enclitic subtest is shown in Table 1.

In the first testing, 12% of the participants did not produce the target enclitics in the 5th test item ("The shore could not be entered because it was washed by the big waves /Obali se nije moglo prići zato što su je zapljuskivali veliki talasi"). In addition, 10.4% of the participants did not produce the target enclitics in the 15th test task ("Maja will comb her hair /Maja će se očešljati/počešljaće se").

Table 1. Distribution of participants' performance in the Enclitic subtest

No.	Enclitics/complete expected answers	No clitic(s) or inadequate clitic		Incomplete answer		Complete answer	
		N	%	N	%	N	%
1.	There is no more milk because the cat drank it/Mleka nema više zato što *ga je* popila mačka.	8	3.2	140	56.0	102	40.8
2.	The cook is dissatisfied because her lunch got burnt/ Kuvarica je nezadovoljna zato što *joj je* zagoreo ručak.	13	5.2	65	26.0	172	68.8
3.	The boy is crying because the cat scratched him/Dečak plače zato što *ga je* mačka ogrebala.	2	0.8	42	16.8	206	82.4
4.	Because his umbrella got broken/ Zato što *mu je* polomljen kišobran.	8	3.2	85	34.0	157	62.8
5.	The shore could not be approached because of the big waves splashing it/Obali se nije moglo prići zato što *su je* zapljuskivali veliki talasi.	30	12.0	135	54.0	85	33.9
6.	The driver is angry because he got fined by the policeman/ Vozač je besan zato što *ga je* kaznio policajac.	5	2.0	57	22.8	188	75.2
7.	The car is shining because Marko washed it/Auto se sija zato što *ga je* Marko oprao.	-	-	94	37.6	156	62.4
8.	There are no more sweets because the children ate them/Bombona više nema zato što *su ih* deca pojela.	3	1.2	147	58.8	100	40.0
9.	The young man is happy because a beautiful girl winked at him/Mladić je zadovoljan zato što *mu je* namignula lepa devojka.	1	0.4	26	10.4	223	89.2
10.	Sara cannot go outside because her mom washed her jacket/ Sara ne može da ide napolje zato što *joj je* mama oprala jaknu.	7	2.8	82	32.8	161	64.4
11.	Petar did not come to work because he felt sick/Petar nije došao na posao zato što *mu je* pozlilo.	5	2.0	26	10.4	219	87.3
12.	Ana did not go to school because she got sick/Ana nije otišla u školu zato što *se* razbolela.	15	6.0	-	-	235	94.0
13.	The actor is happy because he will get a role in a new movie/Glumac je srećan zato što *će* dobiti ulogu u novom filmu.	14	5.6	-	-	236	94.4

14. Milutin is angry because the salesperson did not give him the change/Milutin je besan zato što *mu* prodavac nije vratio kusur.	15	6.0	-	-	235	94.0
15. Maja will comb her hair/ Maja *će se* očešljati/počešljaće se.	26	10.4	104	41.6	120	48.0
16. Mom will pack their things/Mama *će im* spakovati stvari/spakovaće im stvari / spremiće im stvari.	9	3.6	74	29.6	167	66.8
17. Luka and Nikola cannot run because their knees hurt/Luka i Nikola ne mogu da trče zato što *ih* bole kolena.	6	2.4	1	0.4	243	97.2
18. Katarina could not sleep because she had a toothache/Katarina nije mogla da spava zato što *ju je* boleo zub.	8	3.2	181	72.4	61	24.3

Note: N – number of respondents; % – percentage;

In contrast, the highest percentage of incomplete responses, in which participants produced only one of the two target enclitics, was found in the 18th test item ("Katarina could not sleep because she had a toothache/Katarina nije mogla da spava zato što ju je boleo zub"), with 72.4% of the participants, followed by the 8th test item ("There are no more sweets because the children have eaten them/Bombona više nema zato što su ih deca pojela"), with 58.8% of the participants, and the 15th test item ("Maja will comb her hair/Maja će se očešljati/Maja će se očešljati / počešljaće se"), with 41.6% of the participants.

The highest percentage of complete answers was observed in the 17th test item ("Luka and Nikola cannot run because their knees hurt / Luka i Nikola ne mogu da trče zato što ih bole kolena"), with 97.2% of the participants, followed by the 13th test task ("The actor is happy because he will get a role in a new movie/Glumac je srećan zato što će dobiti ulogu u novom filmu"), with 94.4% of the participants.

Proclitic Subtest

The distribution of participants' performance in the Proclitic subtest is shown in Table 2.

The largest percentage of the participants – 62%, did not produce the target proclitic in the 23rd test item ("The teacher scolded Saša because he didn't bring any crayons or markers/Učiteljica je prekorila Sašu zato što nije doneo (ni) bojice ni flomastere"), while 27.2% of the participants omitted the proclitic in the 19th test item ("Mama told Jelena to come/Mama je rekla Jeleni da dođe").

Table 2. Distribution of participants' performance in the Proclitic subtest

No.	Proclitics	No cilitic(s) or inadequate clitic		Complete answers	
		N	%	N	%
19.	Mom told Jelena to come/Mama je rekla Jeleni *da* dođe.	68	27.2	182	72.8
20.	Jovana is sad because she is not going to the sea/Jovana je tužna *jer* ne ide na more.	13	5.2	237	94.8
21.	Sara bought a pen and a book/Sara je kupila olovku *i* knjigu.	12	4.8	238	95.2
22.	Milena's hat is black and Ivana's is blue/ Milenin šešir je crne, *a* Ivanin plave boje.	44	17.6	206	82.4
23.	The teacher scolded Saša because he didn't bring any crayons or markers/Učiteljica je prekorila Sašu zato što nije doneo (*ni)* bojice ni flomastere.	155	62.0	95	38.0
24.	Nina will wear either white pants or a red dress/Nina će obući bele pantalone *ili* crvenu haljinu.	1	0.4	249	99.6
25.	Salmon lives in the Atlantic Ocean/Losos živi *u* Atlantskom okeanu.	2	0.8	248	99.2
26.	The students are sitting on wooden chairs/Učenici sede *na* drvenim stolicama.	-	-	250	100.0
27.	A pigeon flew into the room through the window/Golub je uleteo u sobu *kroz* prozor.	2	0.8	248	99.2
28.	Marija and Marko came from school/Marija i Marko su došli *iz* škole.	2	0.8	248	99.2
29.	The plane took off from the airport/Avion je poleteo *sa* aerodroma.	-	-	250	100.0
30.	Milica went to the dentist/Milica je otišla *kod* zubara/stomatologa.	34	13.6	216	86.4

Note: N – number of respondents; % - percentage;

The highest percentage of complete answers was recorded for the 26th test item ("The students are sitting on wooden chairs/Učenici sede na drvenim stolicama"), and the 29th test item ("The plane took off from the airport/Avion je poleteo sa aerodrome"), where all of the participants gave complete answers.

Reliability of the Measurement

Internal consistency. The Clitic Production Test showed good internal consistency, with $\alpha = .746$ in the first test, and $\alpha = .747$ in the retest.
Test-retest reliability.

Table 3. Test-retest reliability results

| Subtests | Retest | | | | | |
| | Enclitics | | Proclitics | | Total score | |
	ρ	*p*	ρ	*p*	ρ	*p*
Enclitics	.867**	.000	.521**	.000	.851**	.000
Proclitics	.381**	.000	.762**	.000	.587**	.000
Total score	.779**	.000	.678**	.000	.851**	.000

Note: ρ – Spearman's rank correlation coefficient; ** *p* < .001.

According to the results presented in Table 3, a high and statistically significant test-retest reliability was found at the level of *p* < .01, ranging from ρ = .762 for the Proclitic subtest to ρ = .867 for the Enclitic subtest. In addition, a high and statistically significant test-retest correlation of ρ = .851 was found by correlating the total scores of the test and the retest.

Intra-rater reliability. Three months after the first test, the first rater (#1) reassessed the participants' responses. The intraclass correlation coefficient ICC (2.1) was used, which showed excellent reliability for rater #1, indicating agreement between the two measures for the individual subtests and the total Clitic Production Test score (95%CI: [1.00, 1.00]).

Inter-rater reliability. The reliability of the different raters (#1 and #2) was assessed using Cohen's kappa coefficient. The coefficient obtained was 1.00, which indicates excellent agreement between the two raters (*p* < .001). In other words, the raters were in complete agreement in their ratings of participant scores for the overall test and the individual subtests.

Construct Validity

Spearman's rank correlation was used to examine the mutual relationship between the results of the tests used in the first measurement. A high and positive correlation was obtained between the total score and the scores on the Enclitic subtest (ρ = .912, p < .01), as well as the Proclitic subtest (ρ = .739, *p* < .01). In addition, a significant positive correlation between the subtests was also demonstrated (ρ = .430, *p* < .01).

Comparisons of Test Results Based on Socio-demographic Variables

Gender. When comparing participants' scores by gender using the Mann-Whitney U-test, a statistically significant difference was found between genders on the Enclitic subtest (*U* = 6504.000, *z* = -1.972, *p* = .049). Women produced more enclitics than men (15.02 versus 14.44). No statistical significance was found for the other differences examined (Proclitics: *U* = 6995.000, *z* = -1.142, *p* = .254; Total Score: *U* = 6621.500, *z* = -1.759, *p* = .079).

Age and education. Using Spearman's rank correlation, no significant correlation was found between the results in the subtests and the overall result with the age of the participants. However, a significant correlation was found between the test results and the length of education. A low and positive correlation was calculated for the following test scores: Enclitics (ρ = .251, p = .000), and Total score (ρ = .194, p = .002). The results show that participants with more years of education achieved higher scores in these (sub)tests and vice versa.

Region of residence. The comparison of the participants' total performance based on their residence region is shown in Table 4. The Kruskal-Wallis test was used for this analysis.

Table 4. Comparison of the participants' performance depending on their region of residence

Subtest	Region	*M*	*SD*	*Mdn*	*IQR*	Mean rank	Comparison
Enclitics	Western Serbia and Šumadija	15.26	1.87	15.50	2.13	146.12	
	Belgrade	16.31	1.49	16.50	2.00	184.83	χ^2 = 69.933,
	Southern and Eastern Serbia	14.07	2.53	14.50	3.00	106.13	*df* = 4,
	Rep. Srpska	14.56	1.90	14.75	8.00	118.71	p = .000**
	Vojvodina	13.71	1.08	13.50	1.50	71.71	
Proclitics	Western Serbia and Šumadija	10.74	.92	11.00	1.00	127.12	
	Belgrade	11.30	.95	12.00	1.00	169.98	χ^2 = 33.252,
	Southern and Eastern Serbia	10.06	1.38	10.50	2.00	95.23	*df* = 4,
	Rep. Srpska	10.72	.99	11.00	1.25	126.87	p = .000**
	Vojvodina	10.52	.71	10.00	1.00	108.30	
Total score	Western Serbia and Šumadija	26.00	2.25	26.0	2.75	142.80	
	Belgrade	27.61	2.29	28.00	3.00	187.76	χ^2 = 17.969,
	Southern and Eastern Serbia	24.13	3.17	24.00	3.63	93.87	*df* = 4,
	Rep. Srpska	25.28	2.36	25.50	4.00	121.25	p = .000**
	Vojvodina	24.23	1.20	24.50	1.50	81.82	

Note: Statistically significant values are in bold; *M* – mean; *SD* – standard deviation; *Mdn* – median; *IQR* – interquartile range; ** p < .001.

A statistically significant difference in performance was found between subgroups of participants from different regions at the level of *p* < .001 in the results of the individual subtests, as well as in the total score of the Clitic Production Test.

Subsequent comparisons of the participants' performance on the individual subtests and total scores based on their region of residence are shown in Table 5. The Mann-Whitney U-test was used.

Table 5 Comparison of the participants' performance in the subtests and the total score depending on their region of residence

Region, *M (SD)*	Western Serbia and Šumadija	Belgrade	Southern and Eastern Serbia	Republika Srpska	Vojvodina
Enclitics					
Western Serbia and Šumadija 15.26 (1.87)	-	.001**	.006**	.040*	.000**
Belgrade, 16.31 (1.49)	-	-	.000**	.000**	.000**
Southern and Eastern Serbia, 14.07 (2.53)	-	-	-	.386	.034*
Rep. Srpska, 14.56 (1.90)	-	-	-	-	.000*
Vojvodina, 13.71 (1.09)	-	-	-	-	-
Proclitics					
Western Serbia and Šumadija, 10.74 (.92)	-	.001*	.018*	.980	.143
Belgrade, 11.30 (.95)	-	-	.000**	.001**	.000**
Southern and Eastern Serbia, 10.06 (1.38)	-	-	-	.020	.188
Rep. Srpska, 10.72 (.99)	-	-	-	-	.176
Vojvodina, 10.52 (.70)	-	-	-	-	-
Total score					
Western Serbia and Šumadija, 26.00 (2.25)	-	.000**	.001**	.143	.000**
Belgrade, 27.61 (2.29)	-	-	.000**	.000**	.000**
Southern and Eastern Serbia, 24.13 (3.17)	-	-	-	.066	.906
Rep. Srpska, 25.28 (2.36)	-	-	-	-	.002**
Vojvodina, 24.23 (1.20)	-	-	-	-	-

Note: The table shows the levels of significance; $^*p < .05$; $^{**}p < .01$

In the Enclitic subtest, a statistically significant difference was found between participants from all regions except Southern and Eastern Serbia and Republika Srpska. Participants from Western Serbia and Šumadija (15.26) produced more enclitics on average compared to participants from Southern and Eastern Serbia (14.07), Republika Srpska (14.56) and Vojvodina (13.71), but less than participants from Belgrade (16.31). Participants from Belgrade produced more enclitics than all other statistical regions. When comparing the values of participants from Southern and Eastern Serbia (14.07), it was found that they produced significantly more enclitics than participants from Vojvodina (13.71).

In the Proclitic subtest, a statistically significant difference was found between participants from Belgrade (11.30) and all other regions: Western Serbia and Šumadija (10.74), Southern and Eastern Serbia (10.06), Republika

Srpska (10.72) and Vojvodina (10.52). Participants from Western Serbia and Šumadija produced significantly more proclitics (10.76) compared to participants from Southern and Eastern Serbia (10.06), while no significant difference was found compared to participants from Republika Srpska and Vojvodina. In addition, no significant difference was found in the production of proclitics when comparing the results of participants from Southern and Eastern Serbia with those of participants from Republika Srpska and Vojvodina, nor between the participants from Republika Srpska and Vojvodina.

There is also a statistically significant difference between Belgrade (27.61) and all other regions when comparing the total test score: Western Serbia and Šumadija (26.00), Southern Serbia and Eastern Serbia (24.13), Republic of Srpska (25.28), and Vojvodina (24.23). In addition, a statistically significant difference was found between participants from Western Serbia and Šumadija (26.00) compared to Southern and Eastern Serbia (24.13) and Vojvodina (24.23), as well as between participants from Republika Srpska (25.28) and Vojvodina (24.23).

Additionally, an analysis of the total response types in the Clitic Production Test was conducted based on the participants' regions of residence in order to determine the percentage distribution of response types across statistical regions (Table 6).

Table 6. Analysis of types of response based
on the participants' regions of residence

	Region	Complete/ Expected Response		Omission of clitic pronoun		Omission of auxiliary verb		Substitution of clitic		No clitic	
		N	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
	Western Serbia and Šumadija	1187	20.7	193	18.4	33	15.8	29	15.9	58	17.8
	Belgrade	1315	22.9	126	12.0	5	2.4	19	10.4	35	10.7
Categorisation of responses	Southern and Eastern Serbia	1073	18.7	219	20.8	48	23.0	44	24.2	116	35.6
	Republika Srpska	1140	19.9	193	18.4	55	26.3	37	20.3	75	23.0
	Vojvodina	1018	17.8	319	30.4	68	32.5	53	29.2	42	12.9
	Total	5733	76.4	1050	14	209	2.8	182	2.4	326	4.3

Note: *N* – number of respondents; % – percentage;

Regarding the percentage of categorised answers, it was found that the majority of participants (76.4%) in the sample provided the expected complete answers. The highest percentage of such answers was recorded among the participants from Belgrade (22.9%).

As for the incomplete answers, it was found that the participants in the sample omitted the clitic pronoun in 14% of the analysed answers,

with the participants from Vojvodina omitting the clitic pronoun most frequently (30.4%). The auxiliary verb was omitted in 2.8% of the answers analysed, with participants from Vojvodina having the highest percentage of such omissions (32.5%).

In the responses that did not receive points, clitic substitutions were observed in 2.4% of the participants in the sample, especially in participants from Vojvodina (29.2%). The highest percentage of answers without clitics (4.3%), was recorded among participants from Southern and Eastern Serbia (35.6%).

The Relationship between the Performance in the Clitic Production Test and the Sentence Repetition Test

The relationship between performance in the Clitic Production Test and the Sentence repetition test was analysed using Spearman's rank correlation. No statistically significant correlation was found between the results in the Sentence repetition test and the total score of the Clitic Production Test ($\rho = .063$, $p > .05$) as well as on the Enclitic ($\rho = .064$, $p > .05$) and Proclitic ($\rho = .014$, $p > .05$) subtests. In other words, the ability to produce clitics is independent of the ability to repeat sentences in Serbian speakers.

The Relationship between Performance in the Clitic Production Test and the Number Repetition Test

Using Spearman's rank correlation, a low and positive statistically significant correlation was found between scores on the Enclitic subtest and sores on the Number repetition test: Repeating numbers forward ($\rho = .328$, $p < .01$), Repeating numbers backwards ($\rho = .303$, $p < .01$) and the total number repetition score ($\rho = .350$, $p < .01$). Participants who performed better on the Number repetition test produced more enclitics, and vice versa.

In addition, a low and positive statistically significant correlation was found between scores in the proclitic subtest and the number repetition: Repeating numbers backwards ($\rho = .177$, $p < .01$) and the total score in Number repetition test ($\rho = .155$, $p < .01$). Participants who performed better in the working memory task (repeating numbers backwards) and had a higher total score on the Number repetition test produced more proclitics. No significant correlation was found between the results in the proclitic subtest and the subtest of short-term memory, i.e. repeating numbers forward ($\rho = .109$, $p > .05$).

A low and positive significant correlation was also found between number repetition scores and the total score on the Clitic Production Test: repeating numbers forward ($\rho = .285$, $p < .01$), repeating numbers backwards ($\rho = .290$, $p < .01$) and the total score in number repetition ($\rho = .317$, $p < .01$). In other words, higher scores in the Number repetition test correlate with higher scores on the clitic production test, and vice versa.

DISCUSSION AND CONCLUSIONS

The aim of this study was to evaluate the reliability of the Clitic Production Test in neurologically healthy speakers of Serbian from different regions of the Serbian-speaking area, and to investigate the influence of different socio-demographic variables (gender, age, education, region of residence) on clitic production. Performance was evaluated on the basis of the prescribed grammatical rules.

Several significant features of the Clitic Production Test can be derived from the results of this study. *Firstly,* the Test fulfils the criteria of different types of reliability (internal consistency, test-retest reliability, inter-rater reliability and intra-rater reliability). *Secondly*, high positive correlations of the total score with scores of the individual subtests, as well as good correlations between the results of the subtests, indicate good construct validity. *Thirdly,* although in our study females produced significantly more enclitics compared to males, we cannot say with certainty that gender has an effect on clitic production, given the near-borderline significance level reached and the fact that no statistically significant difference was found in either proclitic production or overall performance in the test. *Fourth*, age was not found to be a significant factor in clitic production. *Fifth,* the length of education affects the production of clitics, especially enclitics. In this study, it was shown that individuals with more years of schooling produce a higher number of clitics than those with fewer years of formal education. *Sixth,* the results of our study show that there is a significant difference in the production of clitics between respondents from different regions of the Serbian language area when the performances are evaluated according to the grammatical rules of the standard language, i.e. prescriptive rules.

With respect to average scores, respondents from Belgrade produced the highest number of clitics, followed by those from Western Serbia and Šumadija, Republika Srpska, and Southern and Eastern Serbia, whereas respondents from Vojvodina produced the fewest. An analysis of the responses to individual test items showed that, in cases of incomplete answers, participants most often omitted the clitic pronoun in the tasks assessing the production of two clitics. Such responses were recorded most frequently among participants from Vojvodina.

According to the available literature, it is important to note that grammatical rules include not only recommendations for correct expression but also, in a broader sense, procedures for establishing the connection between linguistic elements and structures in the production of statements (Bugarski, 2003). These grammatical rules are divided into prescriptive and descriptive. Prescriptive grammatical rules refer to the production of expressions that adhere to the norms of written language (e.g. "Dolazim iz Pirota."), whereas descriptive rules cover the entire spectrum of possibilities offered by the language system, not just those

favoured prescriptively (e.g. "Dolazim iz Pirot."). It is important to emphasise that these examples represent statements formed according to grammatical rules and that they differ from ungrammatical sequences. Ungrammatical sequences are utterances that the language system does not anticipate, and that no native speaker of a given language would produce (Bugarski, 2003).

In addition to typical speakers, the knowledge of grammatical rules should also be taken into account when assessing clitics in individuals with language disorders. This is supported by research on the prevalence of clitics in the speech of children and adults with language impairment (Krstić & Vuković, 2013; Vuković & Stojanovik, 2011; Vuković et al., 2020). Moreover, the results of our study suggest that regional background should be considered when evaluating clitic production. For adults in particular, premorbid language characteristics may influence test outcomes, and it is therefore advisable to gather information on grammatical competence prior to the onset of the language disorder, to avoid associating the omission of certain clitics with the symptoms of the disorder. In children, however, premorbid language abilities cannot be assessed, so interpretation must rely solely on age-appropriate language norms and typical developmental expectations.

Turning now to memory, the relationship between verbal memory and the ability to produce clitics is not entirely consistent. On the one hand, no statistically significant correlation was found between the production of clitics and sentence repetition. On the other hand, the statistically significant but low correlation between the result of number repetition and the clitics test indicates a relationship between short-term and working memory and clitics production. In view of the aforementioned inconsistency and the low degree of correlation, however, this result should be interpreted with caution.

When applying this test to individuals with language disorders, multiple factors highlighted in our study should be considered, including regional background, level of education, and memory capacities. These factors, which are also significant in typical language users, may influence test performance and should therefore be taken into account during clinical assessment.

Limitations. The main limitation of this study is the lack of a qualitative analysis of the test results, which should be the next step in our research.

Directions for future research. Given the similarities of Serbian with other languages from the surrounding area, it might be worthwhile to compare the clitic production abilities of speakers of Serbian with speakers of other South Slavic languages. Another challenge for future research is the application of the Clitic Production Test to individuals with language disorders.

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ПРОЦЕНА ПРОДУКЦИЈЕ КЛИТИКА КОД ГОВОРНИКА СРПСКОГ ЈЕЗИКА

Миле Вуковић[1], Љиљана Симић[2], Лана Јеркић Рајић[3]

[1]Универзитет у Београду, Факултет за специјалну едукацију и рехабилитацију, Београд, Србија

[2]Центар Терапика, Београд, Србија

[3]Здравствени центар, Ниш, Србија

Резиме

У овом раду извршена је процена продукције клитика код одраслих, неуролошки здравих говорника српског језика. Циљ нам је био да испитамо ваљаност и поузданост Теста продукције клитика, као и да испитамо да ли постоји разлика у продукцији енклитика и проклитика између испитаника из различитих региона српског говорног подручја. Такође, желели смо да испитамо утицај социодемографских варијабли (пол, године старости, дужина образовања, пребивалиште) на продукцију клитика. Најзад, настојали смо да утврдимо психометријске карактеристике примењеног теста.

У истраживању је учествовало 250 испитаника из пет региона српског говорног подручја, по 50 испитаника из сваког. Поновљено тестирање је извршено на подузорку од 100 испитаника, процентуално подједнако заступљених из сваког региона.

Резултати су показали да Тест продукције клитика испуњава критеријуме различитих типова поузданости (интерна конзистентност, временска стабилност теста, поузданост поновљеног оцењивања од истог испитивача и поузданост оцењивања у односу на различите испитиваче), као и да има задовољавајућу конструктивну ваљаност. Показано је да године образовања утичу на продукцију клитика, нарочито енклитика. Прецизније, особе са већим нивоом образовања продукују више клитика у односу на особе с краћим формалним образовањем. Показана је и значајна разлика у продукцији енклитика између испитаника у односу на пол. Другим речима, у нашем узорку, показано је да жене продукују више енклитика у односу на испитанике мушког пола. Такође, уочена је значајна разлика у продукцији клитика између испитаника из различитих региона српског говорног подручја, када се у оцењивању поштују прескриптивна граматичка правила. У односу на просечне вредности, највише клитика продуковали су испитаници из Београда, затим Западне Србије и Шумадије, Републике Српске, те Јужне и Источне Србије, док су најмање клитика продуковали испитаници из Војводине. Анализом одговора утврђено је да су испитаници, у случају непотпуних одговора, најчешће изостављали клитичку заменицу на задацима којима се процењивала продукција две клитике. Такви одговори су, у највећем проценту, регистровани код испитаника из Војводине. Поред тога, уочена је

значајна повезаност продукције клитика са способношћу понављања бројева (краткорочна и радна меморија).

Резултати нашег истраживања показују да би код процене продукције клитика код особа са поремећајима језика требало прикупити податке о локалитету из којег испитаник долази, како преморбидне карактеристике језичких способности не би утицале на исход клиничке процене. Прецизније, код одраслих особа требало би прикупити податке о њиховом граматичком статусу пре настанка поремећаја језика како се изостављање одређених клитика не би приписало симптомима језичког поремећаја.

С обзиром да је показан значајан утицај година образовања и пребивалишта на продукцију клитика код говорника српског језика, препоручљиво је узимање у обзир ових фактора приликом примене Теста код особа са језичким поремећајима.