



10th Novi Sad workshop on
***Psycholinguistic, neurolinguistic
and clinical linguistic research***

Book of abstracts

Novi Sad
April 22, 2023



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ISBN

978-86-6065-761-1

Acknowledgements

This workshop was organized with the support of the Provincial Secretariat for Higher Education and Scientific Research and the Faculty of Philosophy, University of Novi Sad.

PROGRAMME

9.00 WELCOME NOTE

09.15-11.15 SESSION 1: LANGUAGE DISORDERS (Chair: Silvia Martínez Ferreiro)

09.15-09.45 Olga Buivolova (Center for Language and Brain, HSE University, Moscow, Russia; Federal Center of Brain Research and Neurotechnologies, Moscow, Russia), Maria Ivanova (University of California, Berkeley, CA, USA), Olga Soloukhina (Center for Language and Brain, HSE University, Moscow, Russia), Georgii Gorshkov (Center for Language and Brain, HSE University, Moscow, Russia), Vasilisa Stepanova (Center for Language and Brain, HSE University, Moscow, Russia), Olga Dragoy (Center for Language and Brain, HSE University, Moscow, Russia): *Brain structures critical for language comprehension, production, and repetition*

09.45-10.15 Živa Drakulić Gorše (Division of Neurology, University Medical Centre Ljubljana, Slovenia), Maja Trošt (Division of Neurology, University Medical Centre Ljubljana, Slovenia; Department of Nuclear Medicine, University Medical Centre Ljubljana, Slovenia; Medical Faculty, University of Ljubljana, Slovenia) & Christina Manouilidou (Department of Comparative and General Linguistics, Faculty of Arts, University of Ljubljana, Slovenia): *Testing language abilities in Slovenian-speaking individuals with Parkinson's disease: a background normative study*

10.15-10.45 Nevena Klobučar (School of Communication and Media, Ulster University, UK): *Question production in Italian-speaking PWA*

10.45-11.15 Mile Vuković, Lana Jerkić Rajić (Fakultet za specijalnu edukaciju i rehabilitaciju, Beograd) & Tanja Milovanović (Klinika za rehabilitaciju "Dr Miroslav Zotović", Beograd): *Morphosyntactic abilities in speakers with Broca's aphasia: a preliminary examination*

11.15-11.30 COFFEE BREAK

11.30-13.30 SESSION 2: ASSESSMENT, DATABASES & NORMS (Chair: Seckin Arslan)

11.30-12.00 Marko Liker (Faculty of Humanities and Social Sciences, University of Zagreb, Croatia), Marina Petković Liker (Academy of Dramatic Art, University of Zagreb, Croatia), Martina Sekulić Sović (Faculty of Humanities and Social Sciences, University of Zagreb, Croatia), Aleksandar Savić (University Psychiatric Hospital Vrapče, Croatia; School of Medicine, University of Zagreb, Croatia), Jakša Vukojević (University Psychiatric Hospital Vrapče, Croatia): *Emotional prosody recognition test for Croatian*

12.00-12.30 Wei Xue, Catia Cucchiarini, Roeland van Hout & Helmer Strik (Radboud University, Nijmegen, the Netherlands): *Assessing the intelligibility of pathological speech: deriving subword-level measures without human intervention*

12.30-13.00 Milica Popović Stijačić (Department of Psychology, Faculty of Media and Communications, Singidunum University; Laboratory for Experimental Psychology, Faculty of Philosophy, University of Novi Sad), Dušica Filipović Đurđević (Department of Psychology, Faculty of Philosophy, University of Belgrade; Laboratory for Experimental Psychology, Faculty of Philosophy, University of Belgrade), Martina Sekulić Sović (Department of Linguistics, Faculty of Humanities and Social Sciences, University of Zagreb), Vlasta Erdeljac (Department of Linguistics, Faculty of Humanities and Social Sciences, University of Zagreb): *Sensory-motor norms for 372 Croatian words*

13.00-13.30 Ksenija Mišić (Odeljenje za psihologiju, Filozofski fakultet, Beograd i Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Beograd), Sara Anđelić (Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Beograd), Lenka Ilić (Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Beograd), Dajana Osmani (Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Beograd), Milica Manojlović (Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Beograd) & Dušica Filipović Đurđević (Odeljenje za psihologiju, Filozofski fakultet, Beograd i Laboratorija za eksperimentalnu psihologiju, Filozofski fakultet, Beograd): *Open database of polysemous senses of 308 Serbian polysemous nouns, verbs, and adjectives*

13.30-14.30 LUNCH BREAK

14.30-15.30 PLENARY LECTURE – Alexandra Perović: *Pragmatic skills in adults with Down syndrome: A view from narrative production*

15.30-16 POSTER SESSION (Chair: Sabina Halupka-Rešetar) & COFFEE

Poster 01: Alexandra Marquis (Speech Language Pathology Department, College of Medicine and Health Sciences, United Arab Emirates University, United Arab Emirates) & Dimitrios Ntelitheos (Speech Language Pathology Department, College of Medicine and Health Sciences, United Arab Emirates University, United Arab Emirates): *A comparison between Emirati Arabic children with autism spectrum disorder (ASD) and typically developing children (TD)*

Poster 02: Alina Minnigulova (Center for Language and Brain, HSE University, Moscow, Russia), Elizaveta Davydova (Federal Resource Center for ASD, Moscow State University of Psychology and Education, Moscow, Russia; Chair of Differential Psychology and Psychophysiology, Moscow State University of Psychology and Education, Moscow, Russia), Darya Pereverzeva (Federal Resource Center for ASD, Moscow State University of Psychology and Education, Moscow, Russia), Alexander Sorokin (Federal Resource Center for ASD, Moscow State University of Psychology and Education, Moscow, Russia; Haskins Laboratories, New Haven, CT, United States of America), Svetlana Tyushkevich (Federal Resource Center for ASD, Moscow State University of Psychology and Education, Moscow, Russia), Uliana Mamokhina (Federal Resource Center for ASD, Moscow State University of Psychology and Education, Moscow, Russia), Kamilla Danilina (Federal Resource Center

for ASD, Moscow State University of Psychology and Education, Moscow, Russia), Olga Dragoy (Center for Language and Brain, HSE University, Moscow, Russia; Institute of Linguistics, Russian Academy of Sciences, Moscow, Russia), Vardan Arutiunian (Center for Child Health, Behavior and Development, Seattle Children's Research Institute, Seattle, WA, United States of America): *Thalamus organization in children with ASD*

Poster 03: Han Zhang (Department of Translation and Language Sciences, Universitat Pompeu Fabra, Barcelona, Spain) & Wolfram Hinzen (Department of Translation and Language Sciences, Universitat Pompeu Fabra, Barcelona, Spain; Catalan Institute for Advanced Studies and Research (ICREA), Barcelona, Spain): *Grammar in 'agrammatical' aphasia: What's intact?*

Poster 04: Marija Jozipović, Sara Košutar & Gordana Hržica (University of Zagreb, Croatia): *Referential choice in the narrative discourse of people with aphasia*

Poster 05: Victoria Timofeeva, Alena Ermakova & Aleksandra Nujnenko (National Research University Higher School of Economics, School of Linguistics, Moscow, Russia): *Information Structure of Russian sentences with Direct and Indirect Objects: Interaction of prosody and word order in perception*

16-18.30 SESSION 3: (PSYCHO)LINGUISTICS (Chair: Srdjan Popov)

16-16.30 Seckin Arslan (French National Center for Scientific Research (CNRS)), Mirjana Mirić (Institute for Balkan Studies SASA), Svetlana Ćirković (Institute for Balkan Studies SASA), Cristian Padure (University of Bucharest & Romanian National Center for Roma Culture) & Evangelia Adamou (French National Center for Scientific Research (CNRS)): *Red apple or apple red? Contact-induced language change in Romani noun phrase order*

16.30-17 Blaž Pažon, Vesna Bregar & Klauđija Lukman (University of Ljubljana, Slovenia): *Competing distributions of nominal diminutive suffixes in Slovenian: Do native speakers' preferences reflect corpus data?*

17-17.30 Jana Willer-Gold (University College London, London, UK), Bojana Ristić (University of Ljubljana, Slovenia), Boban Arsenijević (University of Graz, Austria), Nermina Ćordalija (University of Sarajevo, Bosnia and Herzegovina), Nedžad Leko (University of Sarajevo, Bosnia and Herzegovina), Frane Malenica (University of Zadar, Croatia), Franc Lanko Marušič (University of Nova Gorica, Slovenia), Irina Masnikosa (University of Zagreb, Croatia), Tanja Milićev (University of Novi Sad, Serbia), Nataša Milićević (University of Novi Sad, Serbia), Petra Mišmaš (University of Nova Gorica, Slovenia), Ivana Mitić (University of Niš, Serbia), Anita Peti-Stantić (University of Zagreb, Croatia), Branimir Stanković (University of Niš, Serbia), Matea Aurelia Tolić (University of Sarajevo, Bosnia and Herzegovina), Jelena Tušek (University of Zagreb, Croatia), Andrew Nevins (University College London, London, UK): *Conjunct Agreement under Ellipsis allows Gender Mismatches*

17.30-18 Marijana Marelj (University of Utrecht, the Netherlands), Ana Bosnić (University of Utrecht, the Netherlands) & Myrthe Spitzers (University of Utrecht, the Netherlands): *Hosting li at the Syntax-Phonology Interface*

18-18.30 Bojana Ristić (University of Ljubljana), Martha Juliana Aponte Niño (Comenius University Bratislava), María Fernanda Silva Azúa (University of Vienna) & Christina Manouilidou (University of Ljubljana): *Processing Suffixed Pseudowords in Mexican and Colombian Spanish*

18.30 ROUND-UP

PLENARY LECTURE

Pragmatic skills in adults with Down syndrome: A view from narrative production

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Pragmatics is traditionally regarded as a strength in individuals with Down syndrome, in view of severe difficulties with comprehension and production of grammar (e.g. Roberts et al., 2007). However, recent literature suggests difficulties in conversational and narrative skills (e.g., Smith et al., 2017), which may be the result of pragmatic deficits, in addition to syntactic deficits. In this talk, we present data from English-speaking adults with Down syndrome on a measure of narrative production, the Multilingual Assessment Instrument for Narratives (MAIN) (Gagarina et al., 2019). Preliminary data suggest that adults with Down syndrome may have difficulties expressing elements of story structure that are reliant on inferencing and Theory of Mind skills, in addition to the use of complex syntactic structures. Given the elevated risks for age and dementia-related changes in adults with DS, assessments of narrative language skills could offer helpful markers for the evaluation and monitoring of cognitive functioning in ageing adults who have Down syndrome.

WORKSHOP TALKS

Brain structures critical for language comprehension, production, and repetition

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Introduction

Although the neural correlates of language functioning have been in the scope of the neurolinguistic research for the decades, the understanding of underlying mechanisms of language is still far from being covered. Thus, the brain structures crucial for language should be specified (Tremblay & Dick, 2016). One of the most widespread methods for identification of the correlation of the brain damage with some behavioral measure is voxel-based lesion-symptom mapping (VLSM; Bates, 2003); however, it does not allow for assessment of the white matter (WM) pathways involvement in these processes. For that, the indirect structural disconnection-symptom mapping methods can be used (Sperber et al., 2022). In this study, we combine the two methods to find the involvement of grey matter (GM) structures and WM pathways to language comprehension, production, and repetition.

Methods

Eighty-six people with chronic post-stroke aphasia (33 females, Mage = 56.6 years) took part in the study. All participants performed on the Russian Aphasia Test (RAT; Ivanova et al., 2021), developed for the detailed assessment of language functioning on the phonological, lexical-semantic, syntactic, and discourse levels. In this study, we counted the composite scores for language comprehension, production, and repetition, and performed the VLSM analysis to identify the GM correlates for these scores. The resulted VLSM-maps were overlaid onto the Harvard-Oxford Cortical Structural Atlas (Markis et al., 2006) for finding the significant GM regions. To identify the proportion of damage to the WM tracts, we used Tractotron software (a part of the BCBtoolkit; Foulon et al., 2018). The proportion of damage to 7 language-specific tracts were correlated with the behavioral scores.

Results

Based on the participants' results on the 13 subtests of RAT, we calculated the composite scores for language comprehension (M = .90, SD = .06, range .72 - .99), production (M = .67, SD = .26, range 0 - .96), and repetition (M = .76, SD = .23, range 0 - 1). We found the involvement (over 5% of the structure) of 6 GM structures and 4 WM tracts to comprehension; 3 WM tracts to production; and 10 GM structures and 5 WM pathways to repetition of language (for details, see Table 1).

Discussion

In this study, we investigated the involvement of GM structures and WM pathways to language comprehension, production, and repetition. We found the crucial involvement of the temporo-

parietal regions in comprehension and repetition along with the arcuate, inferior fronto-occipital, and inferior longitudinal fasciculi. At the same time, we found no significant VLSM clusters for the composite production score, while it significantly correlated with the proportion of damage to all three segments of the arcuate fasciculus. In the further analysis we will investigate the contribution of each separate subtest of the RAT to these composite scores.

References

- Bates, E., Wilson, S. M., Saygin, A. P., Dick, F., Sereno, M. I., Knight, R. T., & Dronkers, N. F. (2003). Voxel-based lesion–symptom mapping. *Nature neuroscience*, *6*(5), 448-450.
- Foulon, C., Cerliani, L., Kinkingnehun, S., Levy, R., Rosso, C., Urbanski, M., ... & Thiebaut de Schotten, M. (2018). Advanced lesion symptom mapping analyses and implementation as BCBtoolkit. *Gigascience*, *7*(3), giy004.
- Ivanova, M. V., Akinina, Y. S., Soloukhina, O. A., Iskra, E. V., Buivolova, O. V., Chrabaszcz, A. V., ... & Dragoy, O. (2021). The Russian Aphasia Test: The first comprehensive, quantitative, standardized, and computerized aphasia language battery in Russian. *PloS one*, *16*(11), e0258946.
- Makris, N., Goldstein, J. M., Kennedy, D., Hodge, S. M., Caviness, V. S., Faraone, S. V., ... & Seidman, L. J. (2006). Decreased volume of left and total anterior insular lobule in schizophrenia. *Schizophrenia research*, *83*(2-3), 155-171.
- Tremblay, P., & Dick, A. S. (2016). Broca and Wernicke are dead, or moving past the classic model of language neurobiology. *Brain and language*, *162*, 60-71.

Table 1. Involvement of GM structures and WM pathways to language comprehension, production, and repetition

	GM structure	Proportion	WM structure	Correlation coefficient (p<.05)
Comprehension	Angular g.	.15	AFLong	-.39
	Heschl's g.	.1	AFpost	-.48
	MTGtop	.13	IFOF	-.36
	Planum	.3	ILF	-.44
	Temporale			
	STGpost	.2		
	SMGpost	.1		
Production			AFant	-.41
			AFLong	-.52
			AFpost	-.39
Repetition	Central op. cort.	.08	Afant	-.47
	Heschl's g.	.51	AFLong	-.64
	Insular cort.	.1	Afpost	-.62
	MTGpost	.05	IFOF	-.3
	Parietal op. cort.	.12	ILF	-.38

Planum Polare	.31
Planum	.49
Temporale	
STGant	.21
STGpost	.35
SMGpost	.14

Note: GM – grey matter; WM – white matter; g. – gyrus; cort. – cortex; MTGtop – middle temporal gyrus, temporooccipital part; STGpost – superior temporal gyrus, posterior division; SMGpost – supramarginal gyrus, posterior division; op. cort. – opercular cortex; STGant – superior temporal gyrus, anterior division; AFant – arcuate fasciculus, anterior segment; AFlong – arcuate fasciculus, long segment; AFpost – arcuate fasciculus, posterior segment; IFOF – inferior fronto-occipital fasciculus; ILF – inferior longitudinal fasciculus.

Testing language abilities in Slovenian-speaking individuals with Parkinson's disease: a background normative study

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Objective: To prepare Slovene linguistic stimuli for naming and lexical decision task (LDT) to test action-related language function in Parkinson's disease (PD) patients.

Background: PD is a neurodegenerative brain disease caused by dopaminergic neuron degeneration accompanied by motor and non-motor symptoms (Kalia & Lang, 2015). Language dysfunction that impairs speech and the ability to communicate (Smith & Caplan, 2018) is among the less studied non-motor symptoms. PD patients have difficulties processing action-related language, namely *action verbs*, e.g., run, swim (Herrera et al., 2012), and nouns describing highly *manipulable* objects, e.g., pencil, hammer (Bocanegra et al., 2017). Brain regions responsible for executing actions may also be responsible for processing action-related language. Naming is the most widely used task to test lexical retrieval (Salmazo-Silva et al., 2017). To observe mostly lexical retrieval deficits, we chose to include high and low action-related words. LDT tries to observe earlier, more automatic stages of word recognition, where explicit semantic lexical retrieval is not required (McDonald, Brown & Gorell, 1996). We wish to determine if there are action-related language deficits during lexical access. We expect to see more errors and longer response time in both naming and LDT in high activity (HA) or high manipulability (HM) words compared to low activity (LA) or low manipulability (LM) words.

Methods: A naming and a LDT were planned to test PD individuals' performance with action-related language. We selected action verbs from Judith Druks' An object and action naming battery (Druks & Masterson, 1998) and adapted them for Slovenian. We assigned each verb a rank of either HA (e.g., jump) or LA (e.g., yawn). We also selected nouns from IMABASE (Bonin et al., 2020) that we could clearly assign to HM (e.g., scissors) or LM (e.g., cloud) categories. Initial selection was further normed by 120 native Slovene participants via Google form questionnaire. We prepared 268 words, 75 in categories of HA and LA and 193 in categories of HM and LM. The participants assessed the level of activity in selected verbs and the manipulability of selected nouns, scoring them from 1 to 5 points, 1 being highest and 5 being lowest activity or manipulability. We identified the frequency of selected words with the help of the Gigafida corpus (Gigafida 2.0).

Results: From the 120 participants, 76 completed the whole 268-word questionnaire, 24 participants rated 267 words and 20 participants rated less than 267 words. We created a smaller selection of the highest and lowest rated 150 words (70 verbs and 80 nouns). Average

rating, length and frequency for the selected word categories were computed (Table 1). A t-test was performed to determine whether there is a sufficient difference between the average scores of chosen HA and LA words and HM and LM words (Table 2). Average word length and frequency for the selection were also compared (Table 2) to test the difference between categories and enable the comparison of semantic differences.

Conclusions: Novel Slovene language stimuli were created for naming and lexical decision tasks, which should enable us to study lexical retrieval and word recognition for action-related language in PD patients.

Table 1. Average parameters of the stimuli selection

Category	Subcategory	Number of words	Word rating (average)	Word length – number of letters (average)	Word frequency* (average)
activity	high	35	2.4	6.8	51610
activity	low	35	3.8	6.5	47051
manipulability	high	40	1.9	6.3	38633
manipulability	low	40	4.0	6.2	38120

* The value represents the number of concordances in the Slovenian corpus Gigafida. The entire corpus contains around 1.1 billion (1,134,693,333) words.

Table 2. T test scores of the stimuli selection

First t test group	Second t test group	T test score for word rating	T test score for word length	T test score for word frequency
high activity	low activity	2.34×10^{-18}	0.32	0.86
high manipulability	low manipulability	5.99×10^{-52}	0.77	0.97

References

- Bocanegra, Y., García, A. M., Lopera, F., et al. (2017). Unspeakable motion: Selective action-verb impairments in Parkinson’s disease patients without mild cognitive impairment. *Brain Lang.*, 168,37–46.
- Bonin, P., Poulin-Charronnat, B., Lukowski Duplessy, H., et al. (2020). IMABASE: A new set of 313 coloured line drawings standardised in French for name agreement, image agreement, conceptual familiarity, age-of-acquisition, and imageability. *Q J Exp Psychol.*, 73(11), 1862–1878.
- Druks, J., Masterson, J. (1998). An Object and Action Naming Battery [Database record]. *J Neurolinguistics*. Published online, 1998.
- Gigafida 2.0: Korpus pisne standardne slovenščine*, viri.cjvt.si/gigafida
- Herrera E., Rodríguez-Ferreiro, J., Cuetos, F. (2012). The effect of motion content in action naming by Parkinson’s disease patients. *Cortex*; 48(7), 900–904.
- Kalia L. V., & Lang, A. E. (2015). Parkinson’s disease. *Lancet*; 386(9996), 896–912.

- McDonald, C., Brown, G. G., Gorell, J. M. (1996). Impaired set-shifting in Parkinson's disease: New evidence from a lexical decision task. *J Clin Exp Neuropsychol.*, 18(6), 793–809.
- Salmazo-Silva, H., Parente, M .A. de M. P., Rocha, M. S., et al. (2017). Lexical-retrieval and semantic memory in Parkinson's disease: The question of noun and verb dissociation. *Brain Lang.*, 165, 10–20.
- Smith K. M., & Caplan, D. N. (2018). Communication impairment in Parkinson's disease: Impact of motor and cognitive symptoms on speech and language. *Brain Lang.*, 185(August), 38–46.

Question production in Italian-speaking PWA

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Synopsis. The current work presents results from an elicitation task with Italian-speaking, agrammatic, people with aphasia (PWA). The aim of the study is to identify which, if any, of two competing approaches best predicts the empirical findings. Results suggest that neither are entirely satisfactory on their own but a combination of both may be key to make correct predictions.

Two competing approaches. The production of agrammatic PWA has been analyzed as stemming either from a deterioration of grammatical knowledge or a limitation of extra-linguistic capacities which affect language. Among the former, the Tree Pruning Hypothesis (TPH; Friedmann and Grodzinsky, 1997) relates the height of the projections involved in a structure's production with the chances of this being produced: the stronger the impairment in the speaker, the less likely s/he is to produce a structure involving higher nodes. Alternatively, syntactic knowledge may be preserved but its use is compromised by Working Memory (WM) limitations (Carpenter, Miyake and Just, 1994).

Research questions and predictions. The two approaches make different predictions with respect to question production in Italian: according to the TPH, production rates of *yes/no* and *wh*-questions should be comparable in the less impaired aphasic speakers. *Why* questions involve a higher node and should thus not be available. In the alternative approach, if WM limitations affect production, it is likely that a difference among structures varying in complexity is observed. A definition of complexity à la Jakubowicz (2005, 2011) is adopted, i.e. the number of Merge/movement operations and the number (and type) of elements involved is taken into account. The prediction is for *yes/no* and *why* questions to be produced at comparable rates, as they are equally as complex, and for *wh*-questions to be produced less frequently, as their complexity is higher.

Thus the research questions are:

1. Which interrogative is less likely to be produced (*why* vs *wh*-questions)?
2. Does *yes/no* questions pattern with *why* or *wh*-questions?

The experiment. Three participants diagnosed with Broca's aphasia and one with (non-fluent, agrammatic) anomia were tested in an elicitation task. Twelve experimental stimuli for each of the three structures at hand were included. In addition, twelve fillers eliciting a declarative sentence were added. The experimental sessions were recorded and audios were later transcribed. Responses were judged as being either target-like or non-target-like.

Results and discussion. Overall, *yes/no* questions were the most frequent structures to be produced, both in response to experimental stimuli and as substitution errors for *why* and *wh*-questions. The scarcity of *why* questions suggests that the height of the nodes involved may play a role. The lack of *wh*-questions, counterposed to the production of *yes/no* questions, can be accounted for only if derivational complexity is taken into account.

Participants	Who	Why	Yes/No
R.B.	0%	0%	33%
J.M.	0%	16%	33%
L.C.	0%	0%	25%
	0%	5,5%	30,5%

Table 1. Percentage of target-like replies.

Who	<i>Qualcuno ha aperto la porta, ma non sai chi. Lei lo sa, chiedilo a lei.</i> Someone has opened the door, but not know who. She it knows, ask to her.
Yes/No	<i>Ho letto questo libro. Mi sembra che anche Maria l'abbia letto, ma non ne sono sicura.</i> Have read this book. To-me seems that also Maria it has read, but not it are sure. <i>Chiedilo a lei.</i> Ask-it to her.
Why	<i>Maria è triste e vorresti sapere il motivo. Chiediglielo.</i> Maria is sad and would know the reason. Ask-her-it.

Table 2. Stimuli sample.

References

- Carpenter, P.A., Miyake A. and Just M.A. (1994). A capacity approach to syntactic comprehension disorders: making normal adults perform like aphasic patients. *Cognitive Neuropsychology*, 11 (6), 671–717.
- Friedmann, N. and Grodzinsky, Y. (1997). Tense and Agreement in agrammatic production: Pruning the syntactic tree. *Brain and Language*, 56(3), 397–425.
- Jakubowicz, C. (2005). *The language faculty: (Ab)Normal development and interface constraints*. Presentation, GALA 2005, Siena.
- Jakubowicz, C. (2011). Measuring derivational complexity: new evidence from typically developing and SLI learners of L1 French. *Lingua*, 121, 339–51.

Morphosyntactic abilities in speakers with Broca's aphasia: a preliminary examination

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Introduction: Broca's aphasia is a non-fluent type of aphasic syndrome, which is primarily manifested by impairment of language production. In connected speech, patients with this type of aphasia produce short sentences in which they often omit function words and morphemes, or chose inadequate forms.

Aim: This research was conducted to examine the morphosyntactic abilities of people with Broca's aphasia, comparing them with neurologically healthy subjects without a language disorder.

Method: The sample included 15 patients with Broca's post-stroke aphasia, who had relatively intact ability of auditory comprehension. The diagnosis of aphasia was based on the Boston Diagnostic Aphasia Examination. The control group comprised 16 neurologically healthy subjects, without data on the presence of disorders in speech and language development. The patients' mother tongue was Serbian. The new Serbian Morphosyntactic Abilities Test (MAT) was used. The descriptive (Frequency, Percentage, Mean, SD, Min, Max) and inferential (Mann-Whitney U-test) statistics were used in data processing.

Results: We noticed statistically significant differences between people with Broca's aphasia and neurotypical subjects on the MAT ($U = 1.500$, $z = -4.982$, $p = 0.000$). The results showed that people with Broca's aphasia have achieved low scores on the MAT, regardless of age ($\rho = -0.045$, $p = 0.873$) and time post onset ($\rho = 0.330$, $p = 0.229$).

Conclusion: Preliminary results show that the MAT has the potential to detect morphosyntactic deficits in patients with Broca's aphasia.

Key words: Broca's aphasia, morphosyntactic abilities, agrammatism

References

- Thompson, C. K., Meltzer-Asscher, A., Cho, S., Lee, J., Wieneke, C., Weintraub, S., & Mesulam, M. M. (2013). Syntactic and morphosyntactic processing in stroke-induced and primary progressive aphasia. *Behavioural neurology*, 26(1-2), 35–54. <https://doi.org/10.3233/BEN-2012-110220>
- Vuković, M. (2019). *Afaziologija* (Peto izdanje). Beograd: Planeta print.
- Vuković, M. G., Kovač, A. M., & Sukur, Ž. M. (2020). Gramatički defцити govornika srpskog jezika sa Brokinom afazijom - Preliminarno ispitivanje. *Specijalna edukacija i rehabilitacija*, 19(4), 247-261. <https://doi.org/10.5937/specedreh19-30149>

Tables

Table 1. The achievement of patients with Broca's aphasia on the MAT

Descriptives	<i>M</i>	<i>SD</i>	<i>SE</i>	<i>Mdn</i>	<i>IQR</i>	<i>Min</i>	<i>Max</i>
MAT Total	10.47	2.87	0.74	10.00	4	5	14
MAT Nouns	7.33	2.09	0.54	8.00	3	3	10
MAT Verbs	3.13	1.36	0.35	3.00	2	1	5

Note: *M* – mean; *SD* – standard deviation; *SE* – standard error; *Min* – minimum; *Max* – maximum; *Mdn* – median; *IQR* – interquartile range;

Table 2. The achievement of the control group on the MAT

Descriptives	<i>M</i>	<i>SD</i>	<i>SE</i>	<i>Mdn</i>	<i>IQR</i>	<i>Min</i>	<i>Max</i>
MAT Total	14.94	0.25	0.06	15.00	0	14	15
MAT Nouns	5.00	0.00	0.00	5.00	0	5	5
MAT Verbs	4.94	0.25	0.06	5.00	0	4	5

Note: *M* – mean; *SD* – standard deviation; *SE* – standard error; *Min* – minimum; *Max* – maximum; *Mdn* – median; *IQR* – interquartile range;

Emotional prosody recognition test for Croatian

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A series of studies has shown that social cognition abnormalities in patients with schizophrenia have the potential to form a powerful predictor of the type of schizophrenia-spectrum disorder (Lin et al. 2018, Penn et al. 1996, Pinkham et al. 2003). One major area of scientific interest within social cognition disorders is emotion perception in those with schizophrenia, specifically emotional or affective prosody recognition. Those individuals often demonstrate reduced expression as well as hindered comprehension of emotional prosody (Leentjens et al. 1998, Lin et al. 2018). However, it is currently unclear whether emotional prosody recognition impairment constitutes a defining and persistent intrinsic feature of the psychopathology of the schizophrenia-spectrum (Lin et al. 2018). It is therefore evident that more research is needed in this area, with studies from different languages being especially welcome, because they offer the opportunity to correlate data on emotion processing with specific phonetic and linguistic features (Lucarini et al. 2020, Michelas et al. 2014).

Considering that there are currently no valid tests specifically designed to investigate emotional prosody recognition in Croatian, this study is aimed at developing such a tool and testing it on typical healthy speakers of Croatian. The development of this test is a part of a broader research project connected with the global multilingual consortium (Speech Bank Project, <https://discourseinpsychosis.org/>).

The emotional prosody recognition test was developed in two phases. In the first phase two eminent Croatian actors, one female one male, were trained by an experienced theatre director, voice coach and a phonetician in order to produce eight of the basic human emotions (appendix 1), whereby identical linguistic material was repeated with prosodic characteristics corresponding to different emotions. Each speaker was recorded while producing eight basic emotions in two carrier sentences on several attempts (appendix 2). These sentences were then rated by two trained phoneticians in order to select the best production for each speaker, carrier sentence and emotion, which resulted in the total of 32 recorded phrases (with inter-rater agreement above 95%). In the second phase of the test development these 32 phrases were then played to the total of 155 listeners, typical healthy native speakers of Croatian. Their task was to identify the emotion they heard in each phrase by means of an interactive online questionnaire. Listeners were instructed to complete the test in a quiet room with headphones, preferably within in one session. Based on this test the best speaker and the best carrier

sentence were chosen according to the highest percentage of correctly recognised emotion in each phrase (the best overall recognition score for the best speaker and best carrier sentence was 74%, 79% excluding outliers). The test is currently being tweaked and prepared for testing in a clinical setting.

The results from the present investigation will be discussed in terms of the application of this test within a battery of tests bridging psychopathology and linguistics, but also in light of the importance of pragmatic abilities for successful communication.

References

- Leentjens, A. F., Wiersma, S. M., van Harskamp, F., Wilmink, F. W. (1998). Disturbances of affective prosody in patients with schizophrenia; a cross sectional study. *Journal of Neurology, Neurosurgery Psychiatry*, 64(3):375-378. doi: 10.1136/jnnp.64.3.375
- Lin, Y., Ding, H., Zhang, Y. (2018). Emotional Prosody Processing in Schizophrenic Patients: A Selective Review and Meta-Analysis. *Journal of Clinical Medicine*, 7(10), 363. doi: 10.3390/jcm7100363
- Lucarini, V., Grice, M., Cangemi, F., Zimmermann, J. T., Marchesi C., Vogeley, K., Tonna, M. (2020). Speech Prosody as a Bridge Between Psychopathology and Linguistics: The Case of the Schizophrenia Spectrum. *Frontiers in Psychiatry*, 15(11), 531863. doi: 10.3389/fpsy.2020.531863
- Michelas, A., Faget, C., Portes, C., Lienhart, A. S., Boyer, L., Lançon, C., Champagne-Lavau, M. (2014). Do patients with schizophrenia use prosody to encode contrastive discourse status? *Frontiers in Psychology*, 18(5),755. doi: 10.3389/fpsyg.2014.00755
- Penn, D. L., Spaulding, W., Reed, D., Sullivan, M. (1996). The relationship of social cognition to ward behavior in chronic schizophrenia. *Schizophrenia Research*, 20, 327–335. doi: 10.1016/0920-9964(96)00010-2
- Pinkham, A. E., Penn, D. L., Perkins, D. O., Lieberman, J. (2003). Implications for the neural basis of social cognition for the study of schizophrenia. *The American Journal of Psychiatry*, 160, 815–824. doi: 10.1176/appi.ajp.160.5.815

Appendix 1. A sub-set of eight basic emotions included in this investigation.
joy, sadness, fear, anger, disgust, irony/sarcasm, surprise, surprise

Appendix 2. Two carrier sentences included in the test.
Nisu više tu. (eng. *They are no longer here.*)
Bit će bolje. (eng. *Things will get better.*)

Assessing the intelligibility of pathological speech: deriving subword-level measures without human intervention

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Speech intelligibility is an essential though complex construct in speech pathology. It is often measured by asking raters to transcribe what they hear and can be affected by multiple contextual variables. One concern is that intelligibility has frequently been measured excluding context as much as possible, focusing on the acoustic-phonetic decoding of speech (Pommée et al., 2022). In line with this practice, many researchers used speech materials with limited contextual information (e.g., syllables and pseudowords). However, these materials do not consider the impact that suprasegmental-level properties (e.g., rhythm, prosody, and intonation) may have on measures of intelligibility (Miller, 2013). Alternative materials overcoming these problems are semantically unpredictable sentences, which maintain suprasegmental-level properties while minimizing contextual information. Another concern is that using transcriptions to derive intelligibility measures is quite time-consuming and labor-intensive. Therefore, programs that automatically extract intelligibility measures on the basis of transcriptions would be welcome to reduce the amount of human effort required.

In this study, we specifically focus on employing semantically unpredictable sentences (SUS) to address the following research question: *Can we derive reliable and valid subword-level measures of intelligibility from transcriptions without human intervention?* We evaluate two types of subword-level intelligibility measures, namely grapheme accuracy (GAcc) and phoneme accuracy (PAcc) calculated by means of Equation (1). These measures were extracted using ADAPT (Elffers et al., 2015) from two forms of orthographic transcriptions, namely the commonly-used Existing-Word Transcription (EWTrans), which allows only existing words, and All-Word Transcription (AWTrans), which allows also pseudowords. Both forms of transcription appear to be valuable tools (Xue et al., 2023), capable of producing reliable orthography-based measures with reduced influence of contextual information. GAcc is directly extracted from orthographic transcriptions, but PAcc is extracted from corresponding phonetic transcriptions generated using a Grapheme-to-Phoneme converter. The generated phonetic transcriptions may need further human intervention (i.e., manual corrections on incorrectly generated phonetic transcriptions), especially in AWTrans as this allows pseudowords. Thus, in the context of PAcc, we further explored this measure under two conditions, i.e., with and without human intervention, to answer our research question. Information about speakers, speech materials, and raters is given in Table 1.

The results are shown in Tables 2 to 4. In general, Table 2 clearly shows that although GAcc and PAcc in both conditions showed similar mean and standard deviation values, the difference between the means of PAcc in the two conditions (i.e., with and without human intervention) was significant. However, regardless of forms of transcriptions and conditions, both GAcc and PAcc showed similar values in terms of their interrater reliability and their correlations with

VAS, as shown in Tables 3 and 4, respectively. Here VAS is a reliable measure reported by Xue et al. (2020), which was obtained through Visual Analogue Scales. The present study therefore demonstrates that we can derive reliable and valid subword-level measures of intelligibility without human intervention and that these can be employed to develop easy-to-use tools for research and clinical practice.

$$Acc = \frac{N_{total} - N_{substitution} - N_{deletion} - N_{insertion}}{N_{total}} \times 100\%$$

Table1. Information about speakers, speech materials, and raters used in the experiment.

	In total	In detail
Speakers	23	2 non-dysarthric speakers, 11 mild, 8 moderate, and 2 severe
Speech materials	6	The number of syllables in the six SUS: 5, 7, 9, 11, 13, 15
Raters	5	1 male, 4 female

Table 2. Means (Standard Deviation) of the two subword-level measures in the two forms of transcriptions; mean differences are tested between the two forms of transcription with a *t* test for independent samples and between PAcc obtained with vs without human intervention (paired *t* test).

Mean (SD)	GAcc	PAcc		<i>t</i> test
		with	without	
AWTrans	85.57 (20.24)	85.22 (21.37)	84.64 (21.57)	<i>p</i> <0.001
EWTrans	86.02 (21.03)	85.80 (21.94)	85.30 (22.09)	<i>p</i> <0.001
<i>t</i> test	<i>p</i> =0.06	<i>p</i> =0.03	<i>p</i> =0.02	

Table 3. Interrater reliability values (D coefficients) by applying Generalizability Theory.

Interrater reliability	GAcc	PAcc	
		with	without
AWTrans	0.88	0.88	0.89
EWTrans	0.88	0.88	0.89

Table 4. Pearson correlations between our subword-level measures and VAS.

Correlations	GAcc		PAcc			
			with		without	
	AWTrans	EWTrans	AWTrans	EWTrans	AWTrans	EWTrans
VAS	0.73	0.74	0.73	0.74	0.74	0.75

References

- Xue, W., Mendoza Ramos, V., Harmsen, W., Cucchiarini, C., van Hout, R. & Strik, H. (2020). Towards a comprehensive assessment of speech intelligibility for pathological speech. In *Proceedings of Interspeech 2020*, 3146-3150. <https://doi.org/10.21437/Interspeech.2020-2693>
- Elffers, B., Van Bael, C., & Strik, H. (2005). *ADAPT: Algorithm for Dynamic Alignment of Phonetic Transcriptions*. Technical Report at the Department of Language and Speech, Radboud University, The Netherlands.
- Miller, N. (2013). Measuring up to speech intelligibility. *International Journal of Language & Communication Disorders*, 48(6), 601–612. <https://doi.org/10.1111/1460-6984.12061>
- Pommée, T., Balaguer, M., Mauclair, J., Pinquier, J., & Woisard, V. (2022). Intelligibility and comprehensibility: A Delphi consensus study. *International Journal of Language & Communication Disorders*, 57(1), 21-41. <https://doi.org/10.1111/1460-6984.12672>
- Xue, W., van Hout, R., Cucchiarini, C., & Strik, H. (2023). Assessing speech intelligibility of pathological speech: test types, ratings and transcription measures. *Clinical Linguistics & Phonetics*, 37(1), 52-76.

Sensory-motor norms for 372 Croatian words

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The embodiment theories relate the representation of the word's meaning to the simulation of the previous sensory-motor experience with an object denoted by that word (Barsalou, 1999). Numerous research revealed the processing advantage of the words more grounded in sensory-motor experience (Connell & Lynott, 2012; Filipović Đurđević et al., 2016). Keeping up with the new trends in psycholinguistic research (Lynott et al., 2020; Lynott & Connell, 2013; Filipović Đurđević et al., 2016; Myklashevsky, 2018; Speed & Majid, 2017), we collected the sensory-motor strength norms for 372 Croatian words. Additionally, we explored the latent space of the sensory-motor ratings to investigate the relations between the sensory and motor dimensions. Thirty-five students from the Faculty of Philosophy, The University of Zagreb, rated 320 nouns and 52 verbs on 11 five-point scales. Six scales were related to sensory experience (vision, hearing, smell, taste, touch and interoception), and five were related to motor experience (head without mouth, hand and arm, foot/torso, mouth/throat). On each scale, participants rated the extent of the actual sensory-motor experience with an object denoted by the word, as well as the possibility of such an experience. Then we applied the principal component analysis (PCA) with Varimax (orthogonal) rotation to explore the latent structure of the sensory-motor word space separately for average values of the possible and the actual experience. The words in the set were rated as concrete ($M=3.97, SD=.94$), easily imagined ($M=3.99, SD=.93$), and familiar ($M=4.78, SD=.49$). The PCA revealed that sensory-motor variables based on possible experience ratings, concreteness, imageability and familiarity grouped into four factors, explaining 75.8% of the variance. The first component correlated positively with concreteness, imageability, visual, tactile and motor hand experience and negatively with interoception. The second factor correlated positively with gustatory and olfactory sensory strength and motor throat experience. The third factor included motor experience with the torso, feet and legs. The last factor included auditory strength, motor experience related to the head (but not mouth) and familiarity (Table 1). Similar results were recorded for actual sensory-motor experience ratings, where PCA stabilized with four factors solution, explaining 77.1% of the variance (Table 2). The variable loadings were the same for the second and third factors. The difference from the first PCA analysis is that the interoceptive strength moved to the fourth factor with auditory strength, motor experience related to the head (but not mouth) and familiarity.

These results follow previous research and theoretical assumptions. The pattern of extracted components reflects the anatomical and physiological grouping of sensations and motor experience. Thus, words high in concreteness are easily imagined, easily experienced by vision and touch, and denote objects manipulated easily by hand. Concepts experienced auditorily represent highly familiar words and are related to motor experience with the head (excluding the movement of mouth or throat). Concepts easily olfactory/gustatory experienced are related to the movement of the mouth and throat, the moves related to chewing. Finally, concepts related to the movement of the torso are related to the movement of the legs, which is anatomically plausible.

Table 1. Rotated component solution of the first PCA analysis (possible experience)

	Component			
	1	2	3	4
Concreteness	.950			
Imageability	.930			
Visual strength	.881			
Tactile strength	.843			
Hands and arms	.787		.326	
Cenesthesia	-.650		.309	.489
Gustatory strength		.942		
Olfactory strength		.812		
Mouth & throat		.812		
Torso			.911	
Foot and leg			.868	
Auditory strength				.712
Familiarity	.411			.628
Head without mouth	-.350			.578

Table 2. Rotated component solution of the second PCA analysis (actual experience)

	Component			
	1	2	3	4
Concreteness	.944			
Imageability	.939			
Visual strength	.902			
Tactile strength	.745		.372	
Hands and arms	.702		.462	
Gustatory strength		.952		
Mouth & throat		.826		.338
Olfactory strength		.789		
Torso			.869	
Foot and leg			.866	
Head without mouth				.728
Auditory strength				.706
Cenesthesia	-.462		.396	.616
Familiarity	.530			.590

References

- Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences*, 22, 577–660.
- Connell, L., & Lynott, D. (2012). Strength of perceptual experience predicts word processing performance better than concreteness or imageability. *Cognition*, 125, 452–465.
- Filipović Đurđević, D., Popović Stijačić, M., & Karapandžić, J. (2016). A quest for sources of perceptual richness: Several candidates. In S. Halupka-Rešetar & S. Martínez-Ferreiro (Eds.). *Studies in language and mind* (pp. 187–238). Novi Sad, RS: Filozofski fakultet u Novom Sadu.
- Lynott, D., & Connell, L. (2009). Modality exclusivity norms for 423 object properties. *Behavior Research Methods*, 41, 558–564.

- Lynott, D., & Connell, L. (2013). Modality exclusivity norms for 400 nouns: The relationship between perceptual experience and surface word form. *Behavior Research Methods*. 45. 516–526.
- Lynott, D., Connell, L., Brysbaert, M., Brand, J., & Carney, J. (2020). The Lancaster Sensorimotor Norms: multidimensional measures of perceptual and action strength for 40,000 English words. *Behavior research methods*, 52(3), 1271–1291. <https://doi.org/10.3758/s13428-019-01316-z>
- Miklashevsky, A. (2018). Perceptual Experience Norms for 506 Russian Nouns: Modality Rating. Spatial Localization. Manipulability. Imageability and Other Variables. *Journal of Psycholinguistic Research*. 47(3). 641-661.
- Speed, L. J., & Majid, A. (2017). Dutch modality exclusivity norms: Simulating perceptual modality in space. *Behavior Research Methods*. 49(6). 2204–2218. <https://doi.org/10.3758/s13428-017-0852-3>

Open database of polysemous senses of 308 Serbian polysemous nouns, verbs, and adjectives

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The majority of words can denote multiple related objects/phenomena, i.e. can have multiple related senses – so called polysemes. Understanding this linguistic phenomenon is therefore of high importance both in terms of linguistic inquiries and in terms of psychological studies of cognitive mechanisms. Previous research demonstrated that, in addition to the number of senses, processing is also influenced by the balance of sense probabilities (Filipović Đurđević & Kostić, 2021). However, the resources for the study of lexical ambiguity are very sparse (e.g. a database of 150 polysemous Serbian nouns; Filipović Đurđević & Kostić, 2017). Additionally, most of these effects were demonstrated either within a single part of speech category (typically nouns) or for ambiguous words with senses that span across various part of speech (e.g. a record / to record; as pointed out by Eddington & Tokowicz, 2015). Therefore, the goal of this paper is to present a new open database containing raw and categorized native speakers' semantic intuitions for 308 Serbian polysemous nouns (100), verbs (100), adjectives (108) and multiple quantifications representing an array of the level of ambiguity indices.

For each of the polysemous words, we collected semantic intuitions of native speakers by using the total meaning metric (Azuma, 1997). We then categorized the collected descriptions by using three strategies: a) relying solely on semantic intuition, b) relying solely on dictionary descriptions, and c) combining semantic intuitions and dictionary descriptions. Within each strategy, we also monitored and investigated the effect of the coder (the researcher performing the categorization) in order to explore the robustness of each approach. We then generated the sense probability distributions for each word by counting the response frequencies across created categories. In order to quantify the level of ambiguity, we calculated the number of senses, redundancy, and entropy of the obtained sense probability distributions (Shannon, 1948; Filipović Đurđević & Kostić, 2017). Each measure, within each approach was also corrected for the effects of idiosyncratic senses, reflexive verbs etc. This database will be openly available and will provide a useful resource in ambiguity research. In future, this database should be expanded with measures from word embeddings (i.e. BERT; Wiedemann et al., 2019) that separate different word senses. This will allow for quantifying the level of ambiguity on large-scale samples of text that may reveal a more precise estimation of sense numbers and sense probabilities, and would allow for abandoning the counting-of-senses approach (as suggested by Filipović Đurđević et al., 2009). Adding this to the database in the future, and therefore allowing comparison to existing measures may allow another validation point for measures derived from human participants.

A comparison between Emirati Arabic children with autism spectrum disorder (ASD) and typically developing children (TD)

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Our study compares language in ASD and TD Emirati children. ASD is a neurodevelopmental disorder that challenges one's social communication and interaction skills (American Psychiatric Association, 2013). Children with ASD usually differ from age-matched or IQ-matched TD children on various linguistic aspects, including phonological, syntactic, morphological, and semantic aspects of language (e.g., Tager-Flusberg, 1981). Recent figures in the United States of America (USA) estimate that 1 out of every 44 children has ASD (Maenner et al., 2021). In the United Arab Emirates (UAE), ASD affects children at similar rates compared to the USA (e.g., Eapen et al., 2007). To date, the available experimental data on UAE children with ASD is very limited (see e.g., Shaalan et al., 2021). ASD children are expected to differ from TD children in accuracy and error types.

We are reporting initial results of our ongoing study evaluating language in ASD and TD Emirati children. The participants reported here include one ASD boy aged 6 years 11 months, and a TD age-matched boy of 6 years 10 months 29 days from (Marquis, 2021). Evaluations were conducted in Arabic. The measures include a picture-naming task and a speech perception task from Marquis (2021). The naming task has a total of 30 nouns common in Emirati Arabic (based on the EMALAC corpus by Ntelitheos and Idrissi, 2017). For example, when shown an image of a bird, participants were asked /ha:ða/ 'This is ___?' with an interrogative tone and were expected to say /ʕasʕfu:r/ 'bird'. Productions were coded for correct consonant production, error types and total number of errors. The speech perception task is a two-alternative, forced-choice word identification task. Participants hear words recorded from native Emirati Arabic-speaking adults and children, with and without speech articulation problems. Three words were presented in two blocks of 10 items each, five target (correct) productions and five misarticulated (incorrect) versions of the target word, for a total of 60 items. For instance, participants were instructed in Arabic: "You will hear people say the word /flu:s/ 'money'. You must indicate whether you heard the word /flu:s/ 'money' or not". Results reveal that for the picture-naming task, the ASD child obtained 16/30 and the TD child 23/30. In addition, the errors produced by the ASD child were more varied and differed from the TD child (e.g., producing /r/ for /l/, /θ/ for /h/, etc.). For the speech perception task, the ASD child obtained 34/60 and the TD child 51/60. These results show that, for both tasks, the ASD child is below or at the cut-off scores of 1.25 standard deviations below the mean scores established by Marquis (2021). These results suggest lower language scores in ASD. Such research is important in determining the nature of language development in Arabic-speaking children with ASD in the UAE. Our ongoing investigation includes additional tasks and children with ASD, global

development delay, and Down Syndrome who will be age-matched with TD children from Marquis (2021).

References

- American Psychiatric Association (APA). (2013). *Diagnostic and statistical manual of mental disorders*. 5th ed. Arlington, VA: American Psychiatric Association.
- Maenner, M. J., Shaw, K. A., Bakian, A. V., Bilder, D. A., Durkin, M. S., Esler, A., Furnier, S. M., Hallas, L., Hall-Lande, J., Hudson, A., Hughes, M. M., Patrick, M., Pierce, K., Poynter, J. N., Salinas, A., Shenouda, J., Vehorn, A., Warren, Z., Constantino, J. N., & Cogswell, M. E. (2021). Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States. *Morbidity and Mortality Weekly Report Surveillance Summary*, 270 (11), 1–16. <http://dx.doi.org/10.15585/mmwr.ss7011a1>
- Marquis, A. (2021). LATFA: An assessment tool for Emirati Arabic-speaking children. In D. Ntelitheos and T. Leung (Eds.), *Experimental Arabic Linguistics: Studies in Arabic Linguistics* (pp. 125-142). John Benjamins Publishing Company. <https://doi.org/10.1075/sal.10.05mar>
- Ntelitheos, D., & Idrissi, A. (2017). Language growth in child Emirati Arabic. In H. Ouali (Ed.), *Perspectives on Arabic Linguistics XXIX* (pp. 229-248). John Benjamins. <https://doi.org/10.1075/sal.5.10nte>
- Shalan, S., Egan, K., Gould, D., & Olsen, P. (2021). An exploratory longitudinal study of vocabulary development in bilingually exposed children with autism spectrum disorder (ASD) in the United Arab Emirates. In D. Ntelitheos and T. Leung (Eds.), *Experimental Arabic Linguistics: Studies in Arabic Linguistics* (pp. 209-246). John Benjamins Publishing Company. <https://doi.org/10.1075/sal.10.08sha>
- Tager-Flusberg, H. (1981). On the nature of linguistic functioning in early infantile autism. *Journal of Autism and Developmental Disorders*, 11(1), 45-56. <https://doi.org/10.1007/BF01531340>

Thalamus organization in children with ASD

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Introduction

Sensory processing impairments are not included in the range of Autism Spectrum Disorder symptoms consisting of social interaction, communication deficits and repetitive behavior (American Psychiatric Association, 2013). However, sensory processing is reported impaired in ASD (Takarae et al., 2016). The central hub of sensory signals relaying is thalamus (Torricco & Munakomi, 2022). Thus, functional and anatomical alterations of thalamus, thalamic networks and pathways are thought to contribute to sensory processing difficulties and, subsequently, to behavioral deficits in ASD (Iidaka et al., 2019).

Despite, there is a number of studies on thalamus in ASD, for the first time, we aimed to investigate thalamus structure, thalamic functional networks and thalamic white matter pathways using Voxel-based morphometry (VBM; Ashburner & Friston, 2000), rs-fMRI and tractography approaches respectively in one participant group.

Method

A total of 38 native Russian-speaking children participated in the study: 19 children with ASD (5 girls, age range 8.01 - 14.01 years, Mage = 9.9, SD = 1.7) and 19 TD children as a control group (7 girls, age range 7.08 - 12.03 years, Mage = 9.7, SD = 1.5). Processing was performed in CONN (RRID:SCR_009550; Nieto-Castanon, 2020) for resting state fMRI, in Quantitative Imaging Toolkit software for DWI (Cabeen et al. 2018) and in SPM, CAT12 (<https://www.fl.ion.ucl.ac.uk/spm/software/spm12/>; <http://www.neuro.uni-jena.de/cat/>) toolboxes for structural data. To provide between-group comparisons in each metric of each thalamic pathway, we fitted linear mixed-effects models with nested effects. Two-sample t-tests were performed to compare morphometric measures.

Results

Between-group comparisons showed in the ASD group significantly greater RD values in the pathways projecting to the left inferior temporal, left middle temporal, left superior temporal, right inferior temporal cortices; significantly greater FA values in the pathway projecting to the

left central parietal, significantly lower FA values in the pathway projecting to the right inferior temporal cortices; significantly greater AD values in the pathways projecting to the left central parietal, the left inferior temporal cortices; significantly greater MD values in the pathways projecting to the left inferior temporal, left middle temporal, right inferior temporal cortices; decreased volume in the pathway projecting to the left dorsomedial prefrontal cortex.

We did not find any significant differences between groups analyzing GM, WM and CSF. Also, there were no significant results while comparing the index of thalamus lateralization between the groups. Moreover, we found the similar pattern of thalamus lateralization: WM was significantly greater in the left thalamus rather than in the right one in both groups.

We did not find any significant differences between groups analyzing right and left thalamic networks.

Conclusion

We compared thalamic metrics between groups of children with ASD and typically developed children. The next step is to assess the relationships between behavioral measures (language skills, non-verbal IQ, the severity of autistic traits) and significantly different between groups structural, anatomical and functional characteristics of thalamus to obtain the whole picture of thalamus structure and functioning in children with ASD.

References

- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (5th ed.). Washington, DC; London: American Psychiatric Publishing, 947 pp.
- Ashburner, J., & Friston, K. J. (2000). Voxel-based morphometry--the methods. *NeuroImage*, *11*(6 Pt 1), 805–821. <https://doi.org/10.1006/nimg.2000.0582>
- Cabeen, R. P., Laidlaw, D. H., & Toga, A. W. (2018). Quantitative Imaging Toolkit: Software for Interactive 3D Visualization, Data Exploration, and Computational Analysis of Neuroimaging Datasets. *Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM)*, 2854.
- Iidaka, T., Kogata, T., Mano, Y., & Komeda, H. (2019). Thalamocortical Hyperconnectivity and Amygdala-Cortical Hypoconnectivity in Male Patients With Autism Spectrum Disorder. *Frontiers in Psychiatry*, *10*, 252. <https://doi.org/10.3389/fpsy.2019.00252>
- Nieto-Castanon, A. (2020). Handbook of functional connectivity Magnetic Resonance Imaging methods in CONN. *Boston, MA: Hilbert Press*.
- Takarae, Y., Sablich, S. R., White, S. P., & Sweeney, J. A. (2016). Neurophysiological hyperresponsivity to sensory input in autism spectrum disorders. *Journal of Neurodevelopmental Disorders*, *8*, 29. <https://doi.org/10.1186/s11689-016-9162-9>
- Torrico, T. J., & Munakomi, S. (2022). Neuroanatomy, Thalamus. *In StatPearls*. StatPearls Publishing.

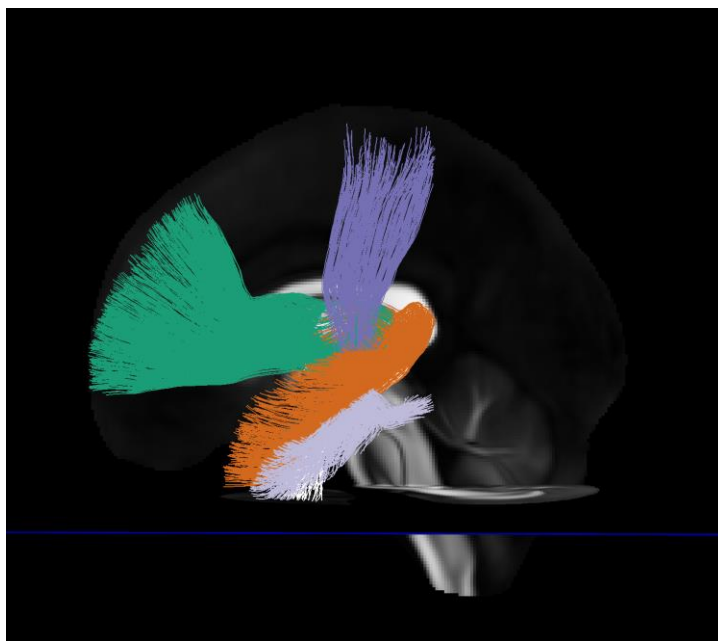


Figure 1. An illustration of the thalamic pathways projecting to the left inferior temporal (white), left middle temporal (gray), left superior temporal (orange), left central parietal (purple), left dorsomedial prefrontal (green) cortices.

Grammar in 'agrammatical' aphasia: What's intact?

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Background: Aphasia following cerebro-vascular accidents has been a primary source of insight for models of language in the brain. However, deviant language patterns in aphasia may reflect processing limitations and cognitive impairment more than language impairment per se.

Aims: We sought to obtain new evidence from spontaneous speech for the intactness of grammatical knowledge in aphasia, operationalized as the preservation of the basic hierarchical structure of syntactic projections.

Methods & Procedures: Speech obtained with the AphasiaBank protocol was analyzed from 20 people with Broca's aphasia (BA) and 20 matched non-brain-damaged controls. We quantified (i) marking of Aspect, Tense, and Modality (A-T-M), which are located at specific (high) layers of the syntactic hierarchy and ordered in relation to one another ([M...[T...[A...]]]); (ii) hierarchies of clausal units ([C...[C]]); (iii) discourse markers embedding clauses, located at the highest layer of the hierarchy; and (iv) attachment of adjuncts at different heights of a given hierarchical syntactic structure. Supplementary evidence was obtained from a typology of errors and from pauses subcategorized according to their hierarchical syntactic position.

Outcomes & Results: Groups did not quantitatively differ on rates of either Aspect or Modality but underproduced T and embedded clauses. Evidence for compensatory effects was seen in both of the latter two cases. While all adjunct types were underproduced in BA, and pauses overproduced, both showed the same relative proportions within both groups. Errors were largely restricted to omissions, of a kind that would also be expected in condensed neurotypical speech.

Conclusions: Overall, these patterns support the hypothesis of intactness of grammatical knowledge in BA, questioning it as a disease model of language impairment.

Keywords: agrammatical aphasia; spontaneous speech; grammatical competence

Referential choice in the narrative discourse of people with aphasia

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Aphasia is an acquired language disorder resulting from damage to the language centers in the brain (ASHA, 2020). Narrative discourse analysis provides a better understanding of the language abilities of people with aphasia. One way to achieve discourse cohesion is through the use of appropriate reference devices to indicate that a piece of information is new (generally indefinite forms, e.g., boy), is given (pronoun), or is assumed (definite forms, e.g., Peter) (Givón, 1989). These pragmatic categories are universal, but the referential devices can vary across languages. The successful use of referential devices depends on linguistic and extra-linguistic factors, including cognitive demands that increase with the number of characters in the story and the gender of the characters (Hendriks et al., 2014).

The aim of this study was to investigate reference in the discourse of people with aphasia (PwA) and typical speakers (TS) through the introduction, maintenance and reintroduction of characters in situations with different cognitive demands (characters of the same gender vs. characters of different gender). Narrative samples of PwA ($n = 17$) and TS ($n = 17$) were retrieved from the *Croatian discourse corpus of speakers with aphasia* (Kuvač Kraljević et al., 2017). The proportions of pronouns and nouns (both in the grammatical role of subject) were calculated for each participant. A 2 x 2 mixed design ANOVA was conducted to test main effects and interaction of group (PwA vs. TS) and situation (same gender vs. different gender).

We found no main effects of group and situation in introduction. In maintenance, there was a main effect of situation ($F(1,32) = 5.993, p < .05$). The proportions of pronouns in both groups were significantly higher in situations with characters of different gender, while the proportions of nouns were significantly higher in situations with characters of the same gender. In reintroduction, we found a main effect of group ($F(1,32) = 4.784, p < .05$), and the interaction of group and situation was also significant ($F(1,32) = 4.157, p = .05$). PwA produced significantly more pronouns compared to TS and the difference was significant in situations with characters of the same gender. There was also a main effect of group ($F(1,32) = 4.621, p < .05$) on the proportion of nouns and the interaction between group and situation ($F(1,32) = .364, p = .550$). TS produced significantly more nouns than PwA. The descriptive statistics is available in Table 1. In cognitively demanding situations, when characters of the same gender need to be reintroduced with nouns, PwA produced a greater number of pronouns than TS, leading to ambiguity and redundancy. Our findings are consistent with studies showing that PwA are prone to erroneous and repetitive referencing patterns, such as the overuse of pronouns (see Arslan et al., 2021; Martinez-Ferreiro et al., 2019; Zhang et al., 2020). To conclude, the present study contributes to the limited knowledge on reference in the discourse of PwA, especially in Croatian, by revealing in which functions and/or situations PwA show the greatest differences compared to TS.

References

- ASHA (2020). Aphasia: Overview. American Speech-Language-Hearing Association. Retrieved January 30, 2023, from <https://www.asha.org/public/speech/disorders/aphasia/>
- Arslan, S., Devers, C., & Ferreiro, S. M. (2021). Pronoun processing in post-stroke aphasia: A meta-analytic review of individual data. *Journal of Neurolinguistics*, 59, 1–20.
- Givón, T. (1983). *Topic continuity in discourse: a quantitative cross-language study*. John Benjamins Publishing Company.
- Hendriks, P., Koster, C., & Hoeks, J. C. J. (2014). Referential choice across the lifespan: why children and elderly adults produce ambiguous pronouns. *Language, Cognition and Neuroscience*, 29(4), 391–407.
- Kuvač Kraljević, J., Hržica, G., & Lice, K. (2017). CroDA: A croatian discourse corpus of speakers with aphasia. *Hrvatska revija za rehabilitacijska istraživanja*, 53(2), 61–71.
- Martínez-Ferreiro, S., Ishkhanyan, B., Rosell-Clarí, V., & Boye, K. (2019). Prepositions and pronouns in connected discourse of individuals with aphasia. *Clinical Linguistics & Phonetics*, 33(6), 1–21.
- Zhang, M, Geng, L, Yang, Y., & Ding, H. (2020). Cohesion in the discourse of people with post-stroke aphasia. *Clinical Linguistics and Phonetics*, 35(1), 1–17.

Table 1. Mean values (with standard deviations) of the proportions of pronouns and nouns depending on the referential functions and the ambiguity of situation

				Introduction		Maintenance		Re-introduction	
		Group	n	1	2	1	2	1	2
Pronouns	PwA		17	0.15(0.34)	0.06(0.24)	0.76(0.33)	0.83(0.33)	0.73(0.32)	0.63(0.33)
	TL		17	0	0	0.74(0.42)	0.90(0.25)	0.51(0.32)	0.50(0.32)
Nouns	PwA		17	0.85(0.34)	0.47(0.51)	0.24(0.33)	0.11(0.26)	0.21(0.26)	0.25(0.24)
	TL		17	0.76(0.44)	0.70(0.47)	0.08(0.24)	0.03(0.09)	0.31(0.26)	0.44(0.31)

Note: Ambiguity of situation – 1 (same gender) and 2 (different gender); PWAs – people with aphasia; TL – typical speakers

Information Structure of Russian sentences with Direct and Indirect Objects: Interaction of prosody and word order in perception

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Introduction

In Russian, prosodic means are widely used due to relative freedom of word order. (Slioussar 2014) and similar works show that prosody is more relevant than word order for identifying focus in a sentence. Nevertheless, in (Slioussar et al. 2019) word order proved to be more significant than prosody. In (Bazhukov et al. 2021) the factor of animacy of objects was additionally considered. Our experiment deals with the information structure of sentences with direct (DO) and indirect (IO) objects and possible differences in perception caused by prosody, word order, and animacy of DO.

Methods

Participants were 43 native Russian speakers (28 women) aged from 19 to 69 (mean age of 33). They were presented with one of four versions of the experiment, which consisted of 40 audio stimuli.

A stimulus is a question and answer pair where the question determines whether DO or IO is in focus and the answer is a sentence with two objects (see Examples). Each question appears once in each version of the experiment and is assigned one of four possibly fitting answers (they vary in prosodic stress on DO/IO and placement of DO/IO at the end of the sentence) using the Latin square design. Also, the stimuli varied in DO animacy (inanimate – 50% of stimuli, animals – 25%, humans – 25%), while all IO and subjects denoted humans. All objects were two-syllable words. Participants rated the Q&A pairs' acceptability on a scale of 1 to 5.

Results

Overall, sentences with appropriate prosodic stress (on the word in focus) and word order generally preferred by Russian (with the word in focus in final position) received the highest scores (mean score of 3.94). Sentences with appropriate prosodic stress and unconventional word order still scored higher (mean score of 3.76) than those in which prosodic stress was not in the right place (mean scores of 3.33 and 3.28 for conventional and unconventional word orders respectively).

We conducted the ordinal regression analysis using R on our dataset to determine the influence of two factors, as well as their interaction: [prosodic] stress and [word] order. Our regression model was used on the whole dataset, on split datasets consisting of sentences with DO/IO in focus, and on split datasets consisting of sentences with inanimate DO, DO denoting animals and DO denoting humans (the outputs are presented in Table 1). On all datasets except one (DO denoting animals) the stress factor proved to be significant. Also, for sentences with IO in focus and sentences with inanimate DO, we can note that the effect of appropriate stress is significantly enhanced by the conventional word order.

Our results confirm that the prosodic factor is prevalent in the perception of Russian sentences with two objects. However, we found the interaction of prosody and word order to be significant for sentences with IO in focus and sentences with inanimate DO.

References

- Bazhukov, M., Chubarova, L., Slioussar, N., & Toldova, S. (2021). The order of objects in Russian: A corpus study. *Computational Linguistics and Intellectual Technologies*, 20, 68-78.
- Slioussar, N. (2014). *Grammar and Information Structure: A novel view based on Russian data*. LOT Publications.
- Slioussar, N., Popova, S., & Tyshkevich, N. B. (2019). Different means to encode IS: how they interact and when they do not. *The 52nd Annual Meeting of the Societas Linguistica Europaea (21st – 24th August 2019)*. Leipzig : Leipziger Universitätsverlag, pp. 532-533.

Examples

- (1) a. *Chto Danya chital bratu?* (DO in focus)
 'What did Danya read to his brother?'
 b. *Danya chital bratu skazki.*
 'Danya read his brother tales.'
- (2) a. *Komu Danya chital skazki?* (IO in focus)
 'Who did Danya read tales to?'
 b. *Danya chital skazki bratu.*
 'Danya read tales to his brother.'

Data	Factor	β	SE	z value	p-value
All data	stress	1.4102	0.3161	4.461	<0.001
Only with DO in focus	stress	0.9817	0.4459	2.202	0.0277
Only with IO in focus	stress	1.8535	0.4646	3.990	<0.001
	stress:order	-1.3390	0.5768	-2.322	0.0203
Only with inanimate DO	stress	2.4774	0.6397	3.873	<0.001
	stress:order	-1.5571	0.7194	-2.164	0.030429
Only with DO denoting humans	stress	1.1062	0.5269	2.099	0.0358

Table 1. The outputs of the regression model (significant results only).

Red apple or apple red? Contact-induced language change in Romani noun phrase order

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Introduction

Cross-language priming is a mechanism that modulates structural language change (Kootstra & Şahin, 2018; Travis et al., 2017). In this study, we test cross-language priming in Romani, an Indic language spoken by the Roma people in the Balkans, which exhibits ongoing structural change. A recent study shows that Romani speakers from Romania attune towards the Noun-Adjective (N-ADJ) order under the influence of Romanian (i.e., ‘apple red’) while the inherited Adjective-Noun (ADJ-N) order (i.e., ‘red apple’) is used less frequently (Adamou et al., 2021). In the current study, we used an eye-movement monitoring experiment to investigate processing of Romani spoken in Romania and Romani spoken in Serbia where the dominant language of the society, Serbian, has the preferred ADJ-N order.

Methods

Two groups of bilingual participants (Romani-Serbian, $n = 30$; Romani-Romanian, $n = 25$) listened to a total of 72 prime and target pairs of noun phrases while they gazed on two visual images per trial (e.g., prime ‘(the) red apple’, target ‘(the) green apple’). Primes (in Serbian/Romanian) and targets (in Romani) were distributed in word order match and mismatch conditions. The task was to click on the target object as quickly as possible. The participants were given an offline acceptability task with the same materials following the main experiment.

Results

Results from the eye-movement monitoring task showed that both the Romani-Serbian and Romani-Romanian groups responded with >97% accuracy. A set of growth-curve models with random intercepts for item and participants computed with the eye-movement data have revealed significant fixed-effects of Mismatch ($\beta = -0.05$, $SE = 0.02$, $t = -2.04$, $p = 0.04$) and interaction of Order:Mismatch ($\beta=0.11$, $SE = 0.04$, $t = 2.64$, $p = 0.008$) among the Romani-Serbian participants. This interaction was modulated by increased looks towards targets in ADJ-N match conditions. That is, when prime and target stimuli matched in ADJ-N order, their processing was facilitated (See Figure 1). Analysis of the Romani-Romanian data shows significant fixed effects of Mismatch ($\beta=-0.18$, $SE = 0.06$, $t = -3.021$, $p = 0.002$) and a three-way interaction for Mismatch:Order:Time³ ($\beta=0.54$, $SE = 0.22$, $t = 2.469$, $p = 0.01$). This is evidenced by the fact that Romani-Romanian speakers had elevated target looks in the N-ADJ match condition as compared to its mismatch counterpart, and that this pattern changed over time (see Figure 2).

Discussion

In summary, we find facilitation effects for the Romani-Serbian group in the ADJ-N/ADJ-N match condition, and for the Romani-Romanian group in N-ADJ/N-ADJ match condition. Results from our offline acceptability task show that Romani-Serbian group accepted both orders in both languages, the Romani-Romanian group strongly dis-preferred the ADJ-N order in both Romanian and Romani. Our study confirms the role of cross-language priming in ongoing structural change in adjective noun order in Romani, in line with the findings reported in Adamou et al. (2021). More specifically, it shows that Romani comprehenders process faster the order that matches the dominant order of the contact language.

References

- Adamou, E., Feltgen, Q., & Padure, C. (2021). A unified approach to the study of language contact: Cross-language priming and change in adjective/noun order. *International Journal of Bilingualism*, 25(6), 1635-1654.
- Kootstra, G. J., & Şahin, H. (2018). Crosslinguistic structural priming as a mechanism of contact-induced language change: Evidence from Papiamentu-Dutch bilinguals in Aruba and the Netherlands. *Language*, 94(4), 902-930.
- Travis, C. E., Cacoullos, R. T., & Kidd, E. (2017). Cross-language priming: A view from bilingual speech. *Bilingualism: Language and Cognition*, 20(2), 283-298.

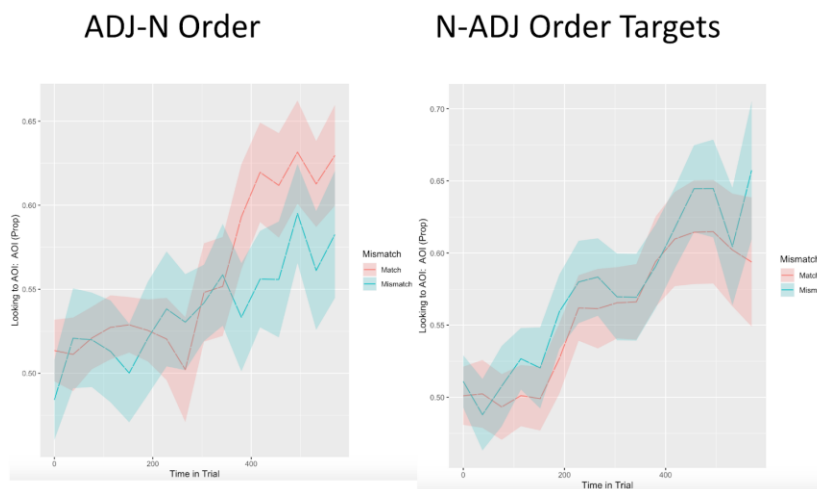


Figure 1. Proportion of looks towards targets in the Romani-Serbian experiment

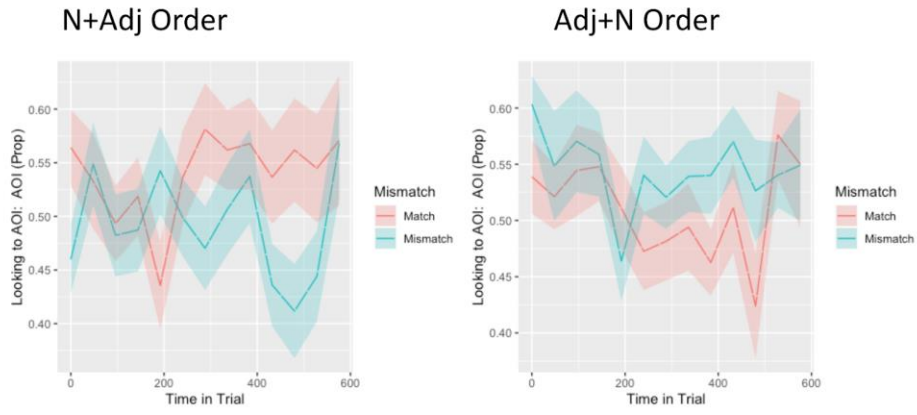


Figure 2. Proportion of looks towards targets in the Romani-Romanian experiment

Competing distributions of nominal diminutive suffixes in Slovenian: Do native speakers' preferences reflect corpus data

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Objective: This study aimed to examine whether native speakers' preferences for masculine nominal diminutive suffixes in Slovenian (e.g., *fantek* 'little boy') match the distribution of these suffixes in the Slovenian corpus Gigafida 2.0.

Background: Our study was methodologically inspired by work by Makarova (2009, 2014) who studied Russian native speakers' preferences for morphemes associated with two Russian aktionsarten, namely the semelfactive (Makarova, 2009) and the attenuative (Makarova, 2014). The verbs in both studies allow speakers the choice of two distinct morphemes for expressing the same notion, which is also supported by corpus data. By instructing participants to fill the gap in a sentence with a verb (Makarova, 2009) or with just a verbal suffix (Makarova, 2014), they could observe whether native speakers would reproduce the morpheme expected based on corpus frequencies. We chose to tackle Slovenian diminutives as diminutive formation in Slovenian often offers the choice of more than one suffix per noun (e.g., the noun *list* 'leaf, sheet of paper' is attested as both *listek* and *listič* in its diminutive form) and this is a necessary prerequisite for this type of approach.

Methodology: We compiled a list of masculine nouns which were attested with at least two diminutive suffixes in the corpus Gigafida 2.0. We hypothesized that participants would use the diminutive suffix that is most common in the corpus (the corpus-dominant suffix) in more than 50% of their responses. We selected 33 of the most appropriate nouns and contextualized them in sentences mostly adapted from the corpus. Each sentence contains one target masculine noun and at least one distractor noun. The distractor noun could be a noun of any gender, as long as it is a common noun which can be relatively easily and meaningfully transformed into a diminutive (e.g., *miza* 'table' is much easier for native speakers to turn into a diminutive than *hitrost* 'speed'). The participants' task is to rewrite the sentences by replacing all nouns with their diminutive forms, as shown in example (1). The questionnaire is being shared online to native speakers of Slovenian above the age of 18 who are mostly students.

Results: Early analyses of responses from 60 participants (73,33 % women) with a mean age of 23,8 years ($SD = 3,9$) show a predicted pattern for only 57,58% of the target nouns, indicating that corpus data may not always be representative of native speakers' language use. Table 1 shows five nouns with the percentages of participant-produced suffixes that matched the corpus-dominant suffix.

Discussion: Based on current results we are likely to conclude that corpus data is not always in line with native speakers' preferences regarding diminutive suffix choice. Findings like this indicate the importance of considering the representativeness of corpus data when using it for research purposes.

We provide an example of an item in (1-a) for the target *črv* ‘worm’, and its corresponding response from one of our participants in (1-b);

- (1) a. *Iz luknje je pokukal črv.*
 out hole-GEN be-AUX peek-PAST worm-NOM
 A worm peeked out of the hole.
- b. *Iz luknjice je pokukal črviček.*
 out hole-GEN-DIM be-AUX peek-PAST worm-NOM-DIM
 A (little) worm peeked out of the (tiny) hole.

Table 1. Five of our target nouns with their respective corpus-dominant suffix and percentages of participants’ responses that reproduced this suffix

Target noun	Corpus-dominant suffix	Produced expected suffix (%)
<i>list</i> ‘leaf, sheet of paper’	-ič/čič	15,0
<i>fant</i> ‘boy’	-ek/ček	75,0***
<i>otrok</i> ‘child’	-iček	21,7
<i>prt</i> ‘tablecloth’	-iček	60,0*
<i>čevelj</i> ‘shoe’	-ec/c	10,0

References

- Makarova, A. (2009). *Psycholinguistic evidence for allomorphy in Russian semelfactives* (Master’s thesis, University of Tromsø). <https://munin.uit.no/handle/10037/2377>
- Makarova, A. (2014). *Variation in pri- and pod- attenuatives in Russian* (Version 2.0) [Data set]. DataverseNO. <https://doi.org/10.18710/TP3TIY>

Conjunct Agreement under Ellipsis allows Gender Mismatches

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Experiments on ellipsis showed that the processor aims to repair ungrammaticality caused by the mismatches between the elided constituent and antecedent (Frazier & Clifton, 2011; Clifton, Xiang & Frazier, 2019; Arregui, Clifton, Frazier & Moulton, 2006). Verb-echo answers to polar questions present a particular case of ellipsis, the subjects are elided from the VP and the verb is stranded. Assuming a syntactically active ellipsis site, AGREE should occur between the elided subject and the stranded verb. The current study investigates cases where elided subject is a complex conjunction phrase, consisting of two NPs of different genders. In South Slavic (Slo and BCS), three agreement options are possible in these cases in non-elided contexts (1a), namely CCA, DEF, and DCA, the pattern which is modified in VS word order, where DCA is not allowed (1b) (Marušič et al., 2015; Willer-Gold et al., 2016; Willer-Gold et al., 2018).

We created dialogues with polar questions containing conjoined NF subjects followed by verb-echo answers. Verb marking in the question was constant (CCA), while the stranded verb in the fragment answer appeared in one of the two relevant agreement options: match (CCA) or mismatch (DCA; Table 1). This presents a specific type of MISMATCH between the stranded verb and its antecedent VP that differed from previously studied ungrammatical ellipsis-antecedent mismatches. A mismatch in fragment answers to SV questions should be allowed, the so-called *switch agreement*, while a mismatch in fragment answers to VS questions should be a disallowed mismatch (Marušič et al., 2015; Willer-Gold et al., 2016; Willer-Gold et al., 2018; Mendes & Ruda, 2018). Importantly, with MM conjunct subjects, which we used as baseline conditions, only one agreement option is allowed, so any change in gender of the stranded verb would be an ungrammatical mismatch (Table 1).

We presented the dialogues in a self-paced reading experiment, where participants (n=188; mean age: 22.99) were asked to read them word by word and rate their acceptability. We ran

linear mixed effects models (LMEM) analysis with rating as dependent variable, Word Order, Gender and Agreement as fixed factors, and by-item and by-subject random intercepts. The *allowed mismatches* (NF SV) were rated as significantly more acceptable than *disallowed mismatches* (NF VS; $z=4.06, p<.0001$), which were in turn rated as significantly more acceptable than *ungrammatical mismatches* in VS MM ($z=-11.88, p<.0001$) (Figure 1). LMEM analyses on stranded verb RTs was run with the same fixed and random effect structure as for the rating. RTs for both *ungrammatical mismatches* in MM were higher than *matches* (z values $>-4.83, p$ values $<.0001$). The disallowed mismatch in NF VS also elicited higher RTs than match ($z=-2.26, p=.02$). However, the difference between *allowed mismatch* and *match* in NF SV wasn't significant ($z=-1.53, p=0.13$; Figure 2).

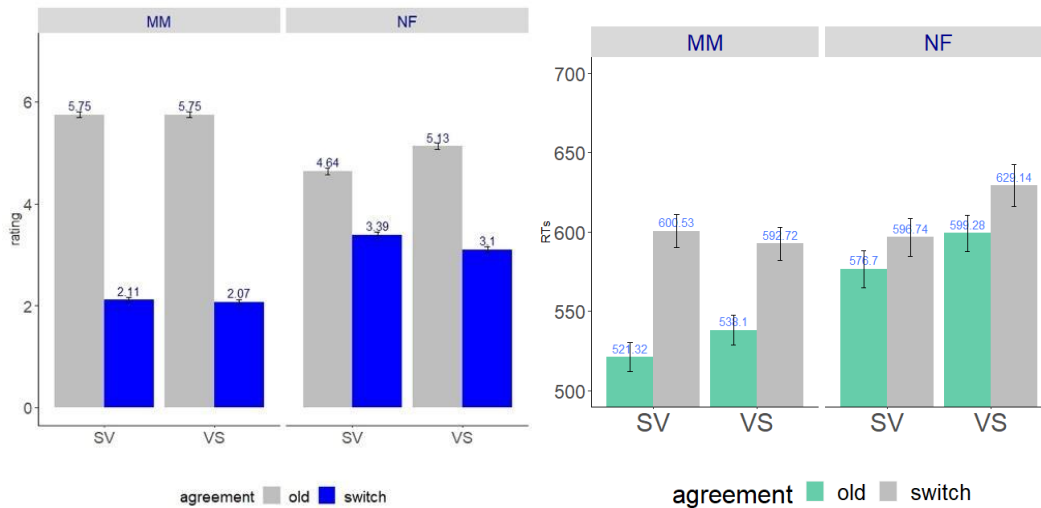
The rating results show an acceptability gradient for different types of mismatch in ellipsis, adding evidence to the existing literature (Kim, Kobele, Runner & Hale, 2011), and signaling to the linguistic theory that the VS *mismatch*, although predicted to be *disallowed*, elicits increased acceptability rates in comparison to the unequivocally *ungrammatical* MM *mismatches*. We also discuss RT results from the perspective of gender markedness (Marušič et al., 2015; Velnic, 2020). Altogether, the results of the current experiment show evidence for a syntactically active ellipsis site, and question the nature of identity constraint that has been claimed to hold between the elided constituent and the antecedent.

(1) BCS

- a. Ravnala i olovke su kupljene> kupljeni> kupljena u dućanu.
 rulers.NPL and pencils.FPL aux.PL bought.FPL(CCA)>bought.MPL(DEF)> bought.NPL(DCA) in shop
- b. U dućanu su kupljena> kupljeni>*kupljene ravnala i olovke.
 in shop aux.PL bought.NPL(CCA)>bought.MPL(DEF)> bought.FPL(DCA) rulers.NPL and pencils.FPL
 "Rulers and pencils are bought in the shop."

Gend	WO	Question	Answer	MATCH	MISMATCH	mismatch type
MM	SV	Jesu li račun.MPL i troškovi.MPL predani.MPL u roku?	Nego šta nego	su predani.MPL	su predana.NPL	<i>ungrammatical</i>
	VS	Jesu li predani.MPL račun.MPL i troškovi.MPL u roku?	Nego šta nego	su predani.MPL	su predane.FPL	<i>ungrammatical</i>
NF	SV	Jesu li ravnala.NPL i olovke.FPL kupljene.FPL u dućanu?	Nego šta nego	su kupljene.FPL	su kupljena.NPL	<i>allowed</i>
	VS	Jesu li kupljena.NPL ravnala.NPL i olovke.FPL u dućanu?	Nego šta nego	su kupljena.NPL	su kupljene.FPL	<i>disallowed</i>
		"Are rulers and pencils bought in the shop?"	"Indeed (they)"	"are bought."	"are bought."	

Table 1. Example of experimental items across the levels of Gender (MM, NF), Word Order (SV,VS) and Agreement (Match, Mismatch) factors



References

- Arregui, A., Clifton, C. Jr., Frazier, L., & Moulton, K. (2006). Processing elided verb phrases with flawed antecedents. *Journal of Memory and Language*, 55, 232–246.
- Clifton, C. Jr., Xiang, M., & Frazier, L. (2019). A note on the voice mismatch asymmetry in ellipsis. *Journal of Psycholinguistic Research*, 1–11.
- Frazier, L., & Clifton, C. Jr. (2011). Dynamic interpretation: Finding an antecedent for VPE. *University of Massachusetts Occasional Papers in Linguistics*, 38, 23–36.
- Kim, C., Kobele, G., Runner, J., & Hale, J. (2011). The acceptability cline in VP ellipsis. *Syntax*, 14(4), 318–354.
- Marušič, F. et al. (2015). The grammars of conjunction agreement in Slovenian. *Syntax*, 18, 39–77.
- Mendes, G. & Ruda, M. (2018). First conjunct agreement in Polish: Evidence for a mono-clausal analysis. *Snippets*, 36.
- Velnic, M. (2020): Acquisition of a transparent gender system: A comparison of Italian and Croatian. *Frontiers in Psychology*, 11.
- Willer-Gold, J. et al. (2016). Conjunct Agreement and Gender in South Slavic: From Theory to Experiments to Theory. *JSL*, 24(1), 187-224.
- Willer-Gold, J. et al. (2018). When linearity prevails over hierarchy in syntax. *PNAS*, 115(3), 495-500.

Hosting li at the Syntax-Phonology Interface

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Background: The P2 nature of Serbo-Croatian (SC) clitics is illustrated in (1). Locating clitics in positions other than P2 leads to ungrammaticality, but their host (P1/W1) can be of any category, X^0 or an XP, argument or a non-argument. This behaviour neatly follows from Bošković's account (Bošković 2001 et seq.) who argues that the P2 effect is phonological in nature. Though pronominal (*mi* in (1)) and auxiliary clitics (*je* in (1)) behave as predicted, SC interrogative clitic *li* might surprise one with respect to the type of host it cliticises (on)to (2). Whereas *li* is unproblematically hosted by a finite verb (2a), when hosted by a participle (2b), the outcome is judged as ungrammatical. Bošković (2001) accounts for the difference in grammaticality between (2a) and (2b) by arguing that the focal feature that can only be checked by head movement, while Migdalski (2009) argues that the inability of *l*-participle to host *li* lies in the fact that it undergoes XP movement. This leads to the following prediction:

- i. *Li* can only be hosted by X^0 .
- ii. Instances where P1/W1 is occupied by XP are ungrammatical in SC.

Bošković (2001), however, already notes the variability among the speakers regarding the productivity of the focus-*li* construction and he also cites examples like (3) where it seems clear that *li*'s host is an XP.

Goal: Considering the clear theoretical predictions spelled-out above and the (already) unclear empirical status of *li*-constructions, the goal of our research was to test the empirical validity of predictions (i) and (ii) and assess the status of *li*-constructions as used by SC speakers.

Method: 103 native Serbian speakers (80 f; 23 m; MA: 31.9) participated in an online truth-value judgment task, focusing on *li*'s host. The questionnaire consisted of 40 items in total - 18 test items, 18 fillers, and 4 controls. It was a 1X3 design with two factors of Clitic (*li*) and Host (X^0 , various instances XPs, and *l*-participles), creating three conditions with 6 observations per condition. Each condition is illustrated in (4). Considering reported judgments suggest *l*-participles behave differently from unambiguous verbs and XPs alike, we found it prudent to keep them separate experimentally, as well.

Results: Figure 1 shows that items with a finite verb as a host (X^0) were accepted at ceiling, which was in line with the existing accounts and judgements. However, instances of XPs hosting *li* had a high acceptance rate, which remains, partially or fully, unaccounted for under existing accounts. Interestingly, *l*-participles were the least favored, but still accepted almost 40%. Closer inspection into the distribution of answers and particular items is ongoing.

Discussion: Empirical findings challenge existing accounts rooted in X^0 vs XP nature of the host and require further understanding. It is particularly the results of the *l*-participle condition that suggest to us that the issues are more complex, requiring anew a closer look at the syntax-phonology interface, rather than phonology alone.

Figure 1. RDI plot for the experiment with clitic *li*, with standard errors. Bars show aggregate acceptance rate, lines show the distribution of answers, and each dot represents the mean of an individual participant's answers.

References

- Bošković, Ž. (2001). *On the Nature of the Syntax-Phonology Interface. Cliticization and Related Phenomena*. Amsterdam: Elsevier;
- Migdalski, K. (2009). On Two Types of Wackernagel Cliticization in Slavic. *Formal Approaches to Slavic Linguistics: The Yale Meeting, 2008*. Ann Arbor, MI: Michigan Slavic Publications, 147-162.

Processing Suffixed Pseudowords in Mexican and Colombian Spanish

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It is proposed that processing morphologically complex words involves two stages after decomposition, namely *licensing* (=checking stem category), and *composition* (=checking semantic compatibility of stem+affix combinations) (Schreuder & Baayen, 1995). This is corroborated by the recent behavioral (Manouilidou, 2007; Manouilidou & Stockall, 2014) and neuroimaging studies (Stockall, Manouilidou, Gwilliams, Neophytou, & Marantz, 2019; Neophytou, Manouilidou, Stockall & Marantz, 2018) that show that pseudowords with argument structure violations are rated as more acceptable, and rejected more slowly and less reliably than pseudowords with category violations. In the current study, we investigate whether the two stages are distinguishable when suffix attachment rules of Mexican and Colombian Spanish are violated. Importantly, we manipulate suffix productivity, which was shown to affect morphological processing (Lázaro, Sainz & Illera, 2015; Burani & Thornton, 2003), and incorporate a range of semantic dimensions to test whether the acceptability contrasts hold across different semantic and categorial well-formedness constraints. In Exp1, we used a low productivity suffix *udo* and high productivity suffix *ble* (López-Villaseñor, Acha, Illera & Sánchez, 2016) (Table 1). *Udo* attaches to nouns that refer to body parts, so we created semantic violation (SemViol) pseudowords by attaching it to object nouns, and category violation (CatViol) pseudowords by attaching it to verbs. *Ble* attaches to various verbs, but it seems not to attach to verbs of growing, change of state, or existence, which we used as bases for SemViol pseudowords. CatViol pseudowords were created by attaching *ble* to object nouns. Additionally, existing words with *udo* and *ble* constituted Gramm words. 42 native speakers of Mexican Spanish performed online acceptability task, where they rated words/pseudowords on a 1-5 scale. Linear mixed effects models analysis [dependent variable: acceptability rating; fixed factors: Condition (CatViol,SemViol,Gramm) x Suffix (udo,ble); random factors: by-item and by-subject intercepts] showed significantly higher acceptability for SemViol in comparison to CatViol, but only for *ble* ($z=-8.47$, $p<.0001$). In order to distinguish whether the difference comes from suffix productivity, or base differences (nouns/verbs), we ran Exp2, where we also included a low productivity verb-attaching suffix *dizo*, and a high productivity noun-attaching suffix *ano* (López-Villaseñor, Acha, Illera & Sánchez, 2016) (Table 1). *Dizo*, like *ble*, doesn't attach to verbs of growing, change of state, or existence, which we used as SemViol bases, while concrete nouns were used as CatViol bases. Finally, *ano* attaches to proper nouns, so concrete nouns were used for SemViol pseudowords, and verbs for CatViol pseudowords. Gramm items were existing words with *dizo* and *ano*. 25 native speakers of Colombian Spanish completed the task online. Following the same procedure and analysis steps from Exp1 (except

that Suffix factor had 4 levels), we replicated the significant SemViol-CatViol contrast for *ble* ($z=-8.72$, $p<.0001$), and the lack of it for *udo*. The contrast was also significant for *dizo* ($z=-4.05$, $p=.0002$), but not *ano* (Figure 1). Although data collection is still ongoing, the results from two varieties of Spanish suggest that the acceptability contrast is present for suffixes attaching to verbs, regardless of their productivity, but not for suffixes attaching to nouns. We discuss how different word categories might impose semantic constraints differently, and how their evaluation might be independent from affix productivity. We are also preparing a lexical decision task, to test whether and how these contrasts play out in online processing.

References

- Burani, C., & Thornton, A. M. (2003). The interplay of root, suffix and whole-word frequency in processing derived words. In Baayen, R. H., & Schreuder, R. (Eds.), *Morphological structure in language processing* (pp 157-207). Walter de Gruyter.
- Lázaro, M., Sainz, J., & Illera, V. (2015). The role of derivative suffix productivity in the visual word recognition of complex words. *Psicologica: International Journal of Methodology and Experimental Psychology*, 36(2), 165-184.
- López-Villaseñor, M. L., Acha, J., Illera, V., & Sánchez, F. J. S. (2016). Written Type and Token Frequency Measures of Fifty Spanish Derivational Morphemes. *The Spanish Journal of Psychology*, 19, 74-12.
- Manouilidou, C. (2007). Thematic constraints in deverbal word formation: psycholinguistic evidence from pseudo-words. In *Proceedings of the 7th International Conference on Greek Linguistics*. York: University of York.
- Manouilidou, C., & Stockall, L. (2014). Teasing apart syntactic category vs. argument structure information in deverbal word formation: A comparative psycholinguistic study. *Italian Journal of Linguistics*, 26(2), 71-98.
- Neophytou, K., Manouilidou, C., Stockall, L., & Marantz, A. (2018). Syntactic and semantic restrictions on morphological recomposition. *Brain and Language*, 183, 11-20.
- Schreuder, R., & Baayen, R. H. (1995). Modeling morphological processing. *Morphological aspects of language processing*, 2, 257-294.
- Stockall, L., Manouilidou, C., Gwilliams, L., Neophytou, K., & Marantz, A. (2019). Prefixstripping re-revisited: MEG investigations of morphological decomposition and recomposition. *Frontiers in Psychology*, 10(1964).

Suffix	CatViol example, number of items	SemViol example, number of items	Gramm example, number of items
-udo	<i>llorar</i> 'cry'+udo = * <i>llorudo</i> , Exp1: 29, Exp2: 29	<i>bolso</i> 'bag'+udo = * <i>bolsudo</i> , Exp1: 29, Exp2: 27	<i>barbudo</i> 'bearded', Exp1:57, Exp2: 32
-ble	<i>piña</i> 'pine'+ble=* <i>piñable</i> , Exp1: 29, Exp2: 28	<i>nacer</i> 'be born'+ble=* <i>nacible</i> , Exp1: 29, Exp2: 28	<i>bebible</i> 'drinkable', Exp1: 57, Exp2: 32
-dizo	<i>pera</i> 'pear'+dizo=* <i>peradizo</i> , 28	<i>crecer</i> 'grow'+dizo=* <i>crecedizo</i> , 28	<i>movedizo</i> 'moving', 22
-ano	<i>comprar</i> 'buy'+ano=* <i>comprano</i> , 29	<i>mesa</i> 'table'+ano = * <i>mesano</i> , 27	<i>coreano</i> 'Korean', 32

Table 1. Examples of items per condition. Number of items per condition (per experiment) is also provided

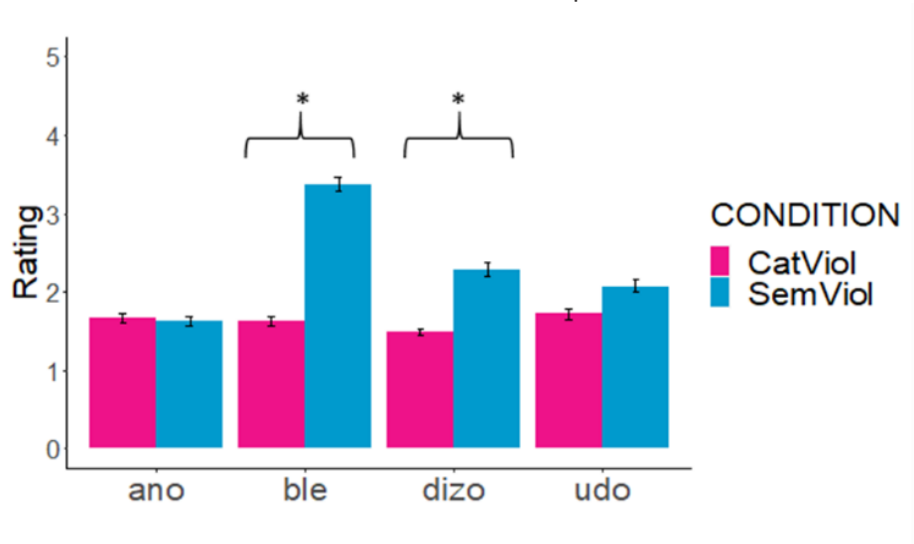


Figure 1. Mean rating per condition in Exp2

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CIP - Каталогизација у публикацији
Библиотеке Матице српске, Нови Сад

81'23(048.3)

**NOVI Sad Workshop on Psycholinguistic, Neurolinguistic and Clinical
Linguistic Research (10 ; 2023 ; Novi Sad)**

Book of abstracts [Elektronski izvor] / 10th Novi Sad Workshop on
Psycholinguistic, Neurolinguistic and Clinical Linguistic Research, Novi Sad,
April 22, 2023. - Novi Sad : Filozofski fakultet, 2023

Dostupno i na: <https://digitalna.ff.uns.ac.rs/sadrzaj/2023/978-86-6065-761-1>. - Opis zasnovan na stanju na dan 24.3.2023. - Bibliografija uz svaki
apstrakt.

ISBN 978-86-6065-761-1

а) Психоллингвистика -- Апстракти

COBISS.SR-ID 112089353