

REVIEW

of the official reviewer for dissertation work

Karlygash Zhaksylykkyzy on the theme «Neurolinguistics of trilingualism: markers of lexico-semantic processing in crosslanguage interaction» presented for the degree of Doctor of Philosophy (PhD) in the specialty «8D02303 – Linguistics»

№	Criteria	Eligibility (one of the options must be checked)	Justification of the position of the official reviewer
1.	The topic of the thesis (as of the date of its approval) corresponds to the directions of development of science and/or state programs	1.1 Compliance with priority areas of science development or government programs:	The dissertation topic “Neurolinguistics of Trilingualism: Markers of Lexico-semantic Processing in Cross-language Interaction” corresponds to the priorities of Kazakhstan’s state policy on trilingualism and multilingual education, as reflected in the State Program for the Development and Functioning of Languages in the Republic of Kazakhstan for 2011–2020. The study is aimed at investigating the cognitive and neurolinguistic foundations of trilingual language processing, with particular emphasis on identifying markers of lexico-semantic interaction across languages, thereby contributing to the scientific understanding of multilingual competence in the context of Kazakhstan’s trilingual education policy.
		1) <u>The thesis was completed within the framework of a project or target program financed from the state budget (indicate the name and number of the project or program)</u> 2) The thesis was completed within the framework of another state program (indicate the name of the program) 3) The dissertation corresponds to the priority direction of the development of science, approved by the Higher Scientific and Technical Commission under the Government	The <u>thesis was completed within the framework of a the program-targeted funding project financed from the state budget</u> (No. BR27198099, “Development of Integrative Scientific Research in Neuroscience”). The research addresses contemporary issues in neurolinguistics, cognitive science, and multilingualism by investigating the neurocognitive mechanisms of lexico-semantic processing in cross-language interaction among trilingual speakers. The study contributes to the advancement of scientific knowledge concerning multilingual language processing, linguistic cognition, and trilingual

		of the Republic of Kazakhstan (indicate the direction)	competence. Furthermore, the research supports the development of Kazakhstan's intellectual and human capital through the generation of new knowledge relevant to multilingual education, language policy, and the promotion of linguistic diversity in a globalized world.
2.	Importance for science	The work makes/does not make a significant contribution to science, and its importance is well disclosed/not disclosed	The dissertation <u>makes a significant</u> contribution to the advancement of scientific knowledge in the fields of neurolinguistics, multilingualism, and cognitive linguistics, and its scientific importance is clearly and convincingly demonstrated. The study expands current understanding of the neurocognitive mechanisms underlying lexico-semantic processing in trilingual speakers and provides new insights into cross-language interaction. The findings contribute to the development of theoretical approaches to multilingual language processing and have the potential to inform future research in neurolinguistics, psycholinguistics, and multilingual education. The significance of the work is well substantiated through its theoretical contributions, methodological rigor, and relevance to contemporary issues of multilingualism in Kazakhstan and beyond.
3.	The principle of independence	Self-reliance level: 1) High; 2) Medium; 3) Low; 4) No independence	The dissertation demonstrates <u>a high</u> level of research independence, as the author independently developed the conceptual and methodological framework of the research, justified the selection of stimulus materials and experimental procedures, and conducted the analysis and integration of behavioural and EEG/ERP data. The proposed integrative design for investigating lexico-semantic processing in trilingualism further reflects the author's capacity for independent scientific inquiry and original interdisciplinary research.
4.	The principle of inner unity	4.1 Justification of the relevance of the thesis: 1) Justified;	The relevance of the dissertation is well justified by the growing need to understand the neurocognitive

		2) Partially justified; 3) Not justified.	mechanisms underlying language processing in multilingual individuals and by the limited neurolinguistic evidence available on trilingualism, particularly within the Kazakh, Russian and English language constellation. The study addresses an important research gap through the integration of behavioural and EEG/ERP data, thereby contributing to the advancement of neurolinguistics, multilingualism research, and the scientific foundations of multilingual education in Kazakhstan.
		4.2 The content of the thesis reflects the topic of the thesis: 1) Reflects; 2) Partially reflects; 3) Does not reflect	The content of the dissertation fully <u>reflects</u> its topic and research objectives. The study consistently addresses the neurolinguistic markers and neurocognitive mechanisms of lexico-semantic processing in cross-language interaction within the context of trilingualism. The research objectives, theoretical framework, methodology, and empirical analysis are closely aligned with the dissertation topic and contribute to its comprehensive investigation.
		4.3. The purpose and objectives correspond to the topic of the thesis: 1) <u>correspond</u>; 2) partially correspond; 3) do not correspond	The purpose and objectives of the dissertation fully <u>correspond</u> to the topic of the research and are logically interconnected. The objectives are logically derived from the overall purpose and comprehensively address the theoretical, methodological, and empirical dimensions of investigating neurolinguistic markers and neurocognitive mechanisms of lexico-semantic processing in cross-language interaction within the context of trilingualism. Their implementation ensures the achievement of the research purpose and contributes to a comprehensive examination of the phenomenon under study.
		4.4 All sections and provisions of the thesis are logically interconnected: 1) <u>completely interconnected</u>;	All sections and provisions of the dissertation are logically interconnected and form a coherent research framework. The object, subject, purpose, and objectives

		2) the interconnection is partial; 3) there is no interconnection	are consistently aligned with the theoretical foundations, research methodology, experimental design, data analysis procedures, and the proposed integrative model of neurolinguistic analysis, ensuring the internal consistency and integrity of the study.
		4.5 The new solutions (principles, methods) proposed by the author are reasoned and evaluated in comparison with the known solutions: <u>1) there is a critical analysis;</u> 2) partial analysis; 3) the analysis does not represent one's own opinions, but quotes from other authors	The study <u>demonstrates a critical analysis</u> of existing approaches by evaluating theoretical models of bilingualism and trilingualism in relation to cross-language processing and identifying their limitations for explaining Kazakh–Russian–English interaction. It further justifies and compares its methodological innovations, such as the translation recognition paradigm combined with EEG/ERP analysis, as an advancement over traditional behavioral-only neurolinguistic studies.
5.	Scientific novelty principle	5.1 Are the scientific results and provisions new? 1) completely new; <u>2) partially new (25-75% are new);</u> 3) not new (less than 25% are new)	The scientific results and provisions presented in the dissertation demonstrate scientific novelty and make a meaningful contribution to the development of integrative neurolinguistics in the context of trilingual language processing. They introduce new empirically grounded models of cross-language activation, including the distinction between “forked” and “roundabout” routes, and provide original evidence from behavioural and ERP/N400 data on asymmetrical lexico-semantic processing in Kazakh, Russian and English trilinguals.
		5.2 Are the dissertation findings new? 1) completely new; <u>2) partially new (25-75% are new);</u> 3) not new (less than 25% are new)	The findings of the dissertation are <u>completely new</u>, as the study introduces the first ERP-based neurolinguistic investigation of lexico-semantic processing in Kazakhstani trilinguals, develops an original experimental paradigm and analytical framework for examining cross-language interaction, systematises Kazakh neurolinguistic terminology, and provides novel empirical evidence on the role of language acquisition sequence, dominance, and functional experience in shaping asymmetric cross-language activation during

		5.3 Technical, technological, economic or management decisions are new and reasonable: 1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	third-language processing. The technical and methodological decisions presented in the dissertation are completely new, as they introduce an original EEG/ERP-based experimental design for investigating trilingual lexico-semantic processing in the Kazakhstani context. These solutions are methodologically justified and ensure the reliable identification of cross-language activation patterns through the integration of behavioural and neurophysiological data.
6.	The validity of the main findings	All main conclusions are/are not based on scientifically significant evidence or well-grounded (for qualitative research and areas of training in the arts and humanities)	All the main conclusions of the dissertation research are <u>based</u> on strong scientific evidence.
7.	The main provisions for the defense	It is necessary to answer the following questions for each provision separately: 7.1 Is the provision proven? 1) proven; 2) rather proven; 3) rather not proven; 4) not proven	<u>Proven.</u> 1. The provision is proven, as the reviewed evidence demonstrates both the interdisciplinary nature of neurolinguistics and the current lack of a systematised Kazakh-language terminological framework, thereby justifying the need for methodological and metalinguistic development in Kazakhstan. 2. The provision is substantiated, as the linguistic and educational context of Kazakhstan has given rise to a distinct group of sequential trilinguals whose language configurations constitute a theoretically sound framework for investigating cross-language activation and lexico-semantic processing. 3. Proven, as the behavioural data demonstrate that incongruent stimuli consistently produce slower reaction times and lower response accuracy than congruent translation equivalents, indicating greater processing difficulty and ruling out a simple speed-accuracy trade-off explanation.

			4. The observed enhancement of the N400 component for incongruent Kazakh and Russian stimuli provides electrophysiological evidence that semantic mismatch is detected during lexico-semantic processing, thereby confirming the temporal dynamics of semantic evaluation in the trilingual mental lexicon. 5. The provision is substantiated, as the differential N400 responses, across stimulus languages and participant language profiles provide evidence for functionally asymmetrical cross-language semantic activation, supporting the proposed distinction between forked and roundabout routes of third-language lexico-semantic access within a dynamic trilingual neurocognitive network.
		7.2 Is it trivial? 1) yes; 2) no	<u>No.</u> The main provisions of the research submitted for defense are not trivial.
		7.3 Is it new? 1) yes; 2) no	<u>Yes.</u> The main provisions submitted for defense are scientifically new.
		7.4 Application level: 1) narrow; 2) medium; 3) wide	The proposed results can be applied in the development of reproducible EEG/ERP-based experimental frameworks for studying trilingual lexico-semantic processing, as well as in future psycholinguistic and neurolinguistic research on cross-language interaction, and in contrastive linguistics and language pedagogy involving Kazakh, Russian, English, and other typologically diverse languages.
		7.5 Is it proven in the article? 1) yes; 2) no	<u>Yes.</u> The principal findings and provisions of the dissertation have been tested and validated through their reflection in 9 scientific publications, including 1 article in Scopus-indexed journal and 5 articles in journals recommended by the Committee for Quality Assurance of

			the Ministry of Science and Higher Education of the Republic of Kazakhstan, 3 articles in proceedings of international conferences, and one trilingual learner's dictionary.
8.	The principle of reliability Reliability of sources and information provided	8.1 Choice of methodology - is justified or the methodology is described in sufficient detail 1) yes; 2) no	<u>Yes</u> . The methodology is described in sufficient detail, as it clearly outlines the rigorous selection of stimuli from authoritative multilingual corpora, the specific demographic breakdown of the 38 sequential trilingual participants, and the three-stage experimental design utilizing the translation recognition paradigm with EEG recording, thereby providing a highly justified and reproducible framework for the study.
		8.2 The results of the thesis were obtained using modern methods of scientific research and methods of processing and interpreting data using computer technologies: 1) yes; 2) no	<u>Yes</u> . The results of the thesis were obtained using modern scientific research methods, specifically the translation recognition paradigm with EEG recording, and advanced methods of processing and interpreting data using computer technologies such as E-Prime, BrainVision, and R/RStudio, ensuring the high reliability and statistical rigor of the empirical findings.
		8.3 Theoretical conclusions, models, identified relationships and patterns have been proven and confirmed by experimental research (for areas of training in pedagogical sciences, the results have been proven on the basis of a pedagogical experiment): 1) yes; 2) no	<u>Yes</u> . The theoretical conclusions, models, identified relationships and patterns have been thoroughly proven and confirmed by experimental research. The comprehensive experimental design and the rigorous analysis of both behavioral and neurophysiological data provide robust, objective validation for the study's findings, ensuring that the proposed theoretical models are fully substantiated by empirical evidence.
		8.4 Important statements are confirmed / partially confirmed / not confirmed by references to current and reliable scientific literature	<u>Confirmed</u> . The dissertation contains extensive references to current and reliable scientific literature, with 227 sources cited, which are used to substantiate the theoretical framework and support the main research findings.

		8.5 Used literature sources are sufficient/not sufficient for a literature review	The literature sources used are <u>sufficient</u> to ensure a comprehensive theoretical foundation and a well-developed literature review covering key aspects of neurolinguistics, psycholinguistics, bilingualism and multilingualism studies, cognitive neuroscience, and language processing.
9	Practical value principle	9.1 The thesis has theoretical value: 1) yes; 2) no	<u>Yes.</u> The dissertation has theoretical value, as it advances neurolinguistic, psycholinguistic, and cognitive neuroscience research in Kazakhstan by elucidating the mechanisms of lexico-semantic processing and cross-language interaction in bilingual and trilingual speakers.
		9.2 The thesis is of practical importance and there is a high probability of applying the results obtained in practice: 1) yes; 2) no	<u>Yes.</u> The dissertation has significant practical value, as it provides a reproducible experimental framework for investigating trilingual lexico-semantic processing using the translation recognition paradigm and ERP methodology, and its stimulus design principles, findings, and conclusions can be applied in future psycholinguistic and neurolinguistic research, as well as in contrastive linguistics, while its practical implementation is evidenced by the publication of a trilingual learner's dictionary.
		9.3 Are the practice suggestions new? 1) completely new; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	The practical recommendations are novel, as they extend the application of EEG, ERP, and N400 methodologies to the investigation of bilingualism and trilingualism in the Kazakhstani context and offer a reproducible methodological framework and stimulus design principles that may be adopted in future neurolinguistic, psycholinguistic, contrastive linguistic, and language-pedagogical studies.
10.	The quality of writing and design	Academic writing quality: 1) high; 2) average; 3) below average;	The dissertation demonstrates a <u>high</u> level of academic writing quality, with clear structure, logical coherence, appropriate use of scientific terminology, and consistent argumentation throughout the text.

		4) low.	
11.	Notes on a thesis		While the dissertation is highly innovative for being the first to use EEG/ERP methods to study three languages in Kazakhstan, it lacks details on how the participants' language skills were actually tested and whether the number of participants was large enough. Because the study has a small number of participants (22 and 16), relying only on self-reported questionnaires might lead to inaccurate results. Providing more details about standard language tests (such as translation or picture-naming tasks) and confirming that the sample size is statistically sufficient would make the study's findings much stronger. However, this does not change the overall positive view of the dissertation. The research is highly professional and careful, and it deserves a favorable evaluation.
12.	Scientific level of the doctoral student's articles on the topic of research (in case of defense of the dissertation in the form of a series of articles, the official reviewers comment on the scientific level of each article of the doctoral student on the topic of research)		The results of the dissertation research were published in 9 (nine) scientific papers by the author, reflecting the main findings of the study. The doctoral student's articles on the research topic are of a high scientific standard and fully explain the process and results of the research.
13.	Decision of the official reviewer (pursuant to paragraph 28 of the present Model Regulations)		To recommend that the Committee award the degree of Doctor of Philosophy (PhD) to the doctoral candidate Zhaksylykkyzy Karlygash.

In reviews, official reviewers indicate one of the following solutions:

- 1) to award the degree of Doctor of Philosophy (PhD) or Doctor of Specialization;
- 2) send the thesis for revision (except for cases of thesis defense in the form of a series of articles);
- 3) refuse to award the degree of Doctor of Philosophy (PhD) or Doctor of Specialization.

Copies of the reviews of the official reviewers are handed over to the doctoral student no later than 5 (five) working days before the defense of the thesis.

Official Reviewer:

Kazakh National Women's Teacher Training University

Program Leader of the Professional Foreign Language

Training Department, PhD Doctor

(place of work, academic title)



Қолы	
Подпись	(signature)
Растаймын: «Қазақ ұлттық ажалдық педагогикалық университеті» КеАҚ HR қызметі	
Заверено: НАО «Казахский национальный женский педагогический университет» HR служба	

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