To the HSE Dissertation Council
in Philology and Linguistics

Personal written reference of
the Dissertation Committee Member

________Kira Gor, Ph.D.________

On the dissertation of Natalia Slioussar

On the topic: «Experimental study of several core concepts of theoretical morphology (on the material of Russian): Regularity, syncretism, markedness», for the purpose of obtaining
Philosophy Doctor in Philology and Linguistics HSE

The dissertation project *Experimental study of several core concepts of theoretical morphology (on the material of Russian): Regularity, syncretism, markedness* by Dr. Natalia Slioussar makes a significant contribution to the current understanding of the complex psycholinguistic mechanisms underlying the processing of inflectional morphology and morphosyntax. It also sheds new light on the neurolinguistic aspects of morphological processing. The project addresses two dimensions in morphological processing: it explores both production and perception, and the morphological processing of isolated inflected words, as well as morphosyntactic processing of words integrated in a sentence and a wider discourse context. All the experiments have been conducted on nominal and verbal morphology in Russian, a language with a rich inflectional system which offers unique opportunities for studying the critical concepts of interest: regularity, syncretism, and markedness. Dr. Slioussar also tests the cue retrieval model in the context of number and gender agreement in Russian.

The work of Dr. Slioussar on the dissertation project goes beyond fundamental science—it addresses the core issues in language processing and extends to the applied issue that is of critical importance to the academic and research community: the development of a state-of-the-art
annotated corpus of the Russian language that is described in a publication in the highly ranked journal of the Psychonomic Society.

The findings of the dissertation study have been published in seven top-tier journals in psycholinguistics and neurolinguistics: Dr. Slioussar single-authored three articles, and firstauthored another three (she was the corresponding author rather than the first author on one of them). Another nine publications authored and coauthored by Dr. Slioussar, mostly in form of journal articles, that are listed in the bibliography provided in the manuscript explore the research agendas adjacent to the main topic of the dissertation study. The findings of the study have been presented at numerous high-profile international conferences.

I would like to state from the outset that both the quality and the quantity of Dr. Slioussar’s scholarly output is outstanding, and that her dissertation project is already making a strong impact on the thinking about morphological processing in the international research community. Given the exceptional contribution of the dissertation study by Dr. Slioussar to the field, I nominate her to be awarded a degree of the Doctor of Science in Philology and Linguistics HSE cum laude. In the rest of my reference letter, I will present an in-depth analysis of the dissertation study and provide a rationale for my high assessment of Dr. Slioussar’s research contributions.

The dissertation by Dr. Slioussar (75 pages, double-spaced) consists of five chapters, a list of references, and seven appendices, which provide full texts of the articles published in open access journals, and links to the articles protected by the journal copyright. The main narrative includes the following chapters: Introduction (Ch. 1), Production and processing of isolated word forms (Ch. 2), Production and processing of word forms in a sentence (Ch.3), Creating resources for experimental research (Ch. 4), and Conclusions (Ch.5). In the rest of the reference letter, I will follow the narrative of the dissertation and first discuss the clusters of studies falling into the categories of the production and perception of inflected words presented in isolation, and then in
sentence context, and conclude by discussing the design and implementation of the web-based searchable annotated corpus of Russian developed by the team lead by Dr. Slioussar.

Two published fMRI studies (Slioussar et al., 2014, and Kireev et al., 2015), and one study presented at conferences are devoted to the production and perception of Russian verbal morphology. This cluster of studies establishes Dr. Slioussar as an international expert in neurolinguistic correlates of morphological regularity/irregularity. The studies engage with the long-going debate about the neurolinguistic processes underlying the production and perception of regular and irregular morphology and focuses on Russian, a morphologically rich language. The first proposals regarding the regular/irregular dichotomy were made with reference to English past-tense verbal morphology that has limitations as a testing ground for psycholinguistic correlates of the construct of regularity/irregularity. Russian verbal morphology with numerous verb classes, aka conjugational patterns, and graded effects of regularity provides vast opportunities to dissociate the role of regularity, defaultness, productivity, and type frequency of the verb class in morphological processing. In fact, the debate has always been about whether all, some, or none of the morphologically complex words are decomposed into constituent morphemes rather than about morphological regularity/irregularity per se.

The publications included in the dissertation report two different types of analysis of the dataset collected in an fMRI study of verb production by adult native speakers of Russian with no cognitive or speech impairments. It should be noted that this is one of the rare studies which uses a production rather than a perception task, and it thereby adds a welcome production dimension to the body of neurolinguistic literature on morphological processing. The study relies on a dichotomous design often used in the research on regular/irregular morphology: contrasting a regular, productive, high type frequency default pattern with an irregular, low type frequency unproductive one. The publication by Slioussar and colleagues (2014) reports the results of a subtractive analysis: The activity in the left inferior frontal gyrus (LIFG) is greater for irregular than regular verbs. This effect, the opposite of what is reported for English irregular past-tense
verbs, is explained in the article by an increased processing difficulty for irregular verbs in Russian. This conclusion is in conformity with our own behavioral findings on native speakers and second language learners of Russian (Gor & Jackson, 2013) that had led to our Nesting Doll model of Russian verb processing.

The second publication (Kireev et al., 2015) investigates the changes in functional connectivity across the regions of interest and establishes that the functional connectivity of the LIFG with the left temporal lobe is relatively increased during the production of regular verbs compared to irregular verbs. Taken together, these two sets of effects point to a neural dissociation of morphological regularity and processing difficulty. The subsequent yet unpublished perception study reported in the dissertation uses three types of verbs: the -aj-class—a regular, productive, high type frequency, and default class; the -i- class—a high type frequency, productive, and nondefault regular class involving more complex stem allomorphy, and a cluster of irregular conjugation types—low-frequency, unproductive, nondefault, and involving low-frequency patterns of stem allomorphy. The results of the study align with the results of the previous studies, and add a new effect—that of the default conjugational pattern (the -aj-class) that shows the lowest level of activation in the LIFG and the strongest functional connectivity. Dr. Slioussar concludes that the findings support the dual-system approach to morphological processing, which, in the case of Russian verbal morphology, categorically contrasts the default conjugational class and all the other classes. The set of neuroimaging studies devoted to the processing of Russian verbal morphology authored by Dr. Slioussar is pioneering in several aspects: it compares the neurolinguistic mechanisms in production and perception and identifies the neural correlates of different properties of inflectional classes, such as defaultness and morphological complexity.

Dr. Slioussar extends the study of inflectional morphology from a single-word presentation to morphosyntactic processing in sentences: four publications included in the dissertation study focus on the processing of morphosyntax. These publications explore the
patterns of attraction errors in number agreement (Slioussar, 2018a) and gender agreement (Slioussar and Malko, 2016), and the role of prototypicality of inflections in subject-verb gender agreement (Slioussar, 2018b), and the role of word order and sentence context in the processing of case morphology (Slioussar, 2011). In this strand of research, Dr. Slioussar attacks the problems currently discussed in psycholinguistic literature and uses an innovative design with clear testable predictions allowing her to address very specific hypotheses and tease apart competing accounts of agreement attraction effects. As a result, her work advances and deepens our understanding of the processing of gender and number agreement in subject-verb phrases.

The study of the syncretism of case-marking inflections in subject-verb number agreement attraction (Slioussar, 2018a) reports one production and two perception experiments (a speeded grammaticality judgment and a self-paced reading (SPR) task). These three experiments, with SPR reporting the key findings, support the cue-based retrieval approach to agreement attraction. Overall, the study shows that a parallel analysis of an ambiguously inflected syncretic form can be temporarily active and an alternative feature set temporarily available, even though no parallel syntactic parses are considered and no reanalysis is attempted. Another conclusion which has important implications for our understanding of morphosyntactic processing, is that cue-based retrieval should rely on compound cues (such as \{nominative+plural\} in the reported study) instead of a set of individual cues.

The second study devoted to agreement attraction (Slioussar and Malko, 2016) includes one production and three self-paced reading experiments. It targets gender agreement in subject NPs and focuses on markedness in the processing of the gender feature. The outcomes of the study shed new light on markedness in production versus perception—indeed, masculine gender, the highest in frequency, is the weakest in triggering gender agreement attraction errors. At the same time, in production, the gender hierarchy is different: feminine is the most marked, and neuter is the most unmarked gender.
The last study dealing with agreement (Slioussar, 2018b) does not recur to agreement attraction in its design; rather, it focuses on the prototypicality of inflections in the processing of gender agreement. The results of the study indicate that the predictions made about the gender of the predicate are stronger for masculine subjects, which agrees with the findings of Dr. Slioussar in a different study (Slioussar and Malko, 2016), and our own research (Romanova and Gor, 2017). At the same time, the study concludes that no gender or declension is intrinsically more difficult to process in the sentence context for adult native speakers.

However, agreement errors are noticed significantly later with non-typical third-declension feminine nouns ending in a consonant than for typical first- and second-declension nouns, while error-related delay on subsequent words is greater for masculine than for feminine subjects. In other words, the effect of declension manifests itself at an early stage and is transient, while the effect of gender manifests itself later and is more pronounced. As can be seen from this brief review, each study authored by Dr. Slioussar contributes to the elucidation of different aspects of the processing of gender and number agreement. They are meticulously designed, and the results are thoughtfully discussed with regard to the existing theoretical approaches and evaluated on their own merit. Together, this body of literature makes a fine contribution to the literature on gender and number agreement and agreement attraction.

Finally, Dr. Slioussar investigates the role of canonical and non-canonical word order in the processing of case-inflected nouns and adjectives in two types of context: congruent and incongruent from the information-processing perspective (Slioussar, 2011). Russian language has a topic-comment structure, with the rheme (new information) provided at the end, and the theme (old information) provided in the beginning. Thus, word order in a sentence interacts with the preceding context, with scrambling expected as a means of maintaining coherence from the information-structure perspective. The study concludes that the processing of case-inflected word forms in a sentence depends both on their status from the information-structure perspective and their syntactic position.
The last area of the dissertation project summarized in the publication by Alexeeva and colleagues (Alexeeva et al., 2018) is an excellent example of top-notch research-based ‘service to the profession’: the design, development, and implementation of StimulStat, a web-based searchable corpus of Russian that includes an impressive number of lexical properties (over 70) for 52,000 lemmas and more than 1.7 million word forms. The lemmas with part-of-speech tags and lemma frequencies are drawn from The Frequency Dictionary of Modern Russian Language (Lyashevskaia & Sharov, 2009), which is based on the subcorpus of the Russian National Corpus (www.ruscorpora.ru), the most representative corpus of modern Russian containing 92 million words. StimulStat lists more parameters than most databases created for other languages, starting with lexical frequency, grammatical properties, and including orthographic and phonological neighborhood characteristics, the uniqueness point, semantic properties: homonymy and polysemy, and also subjective parameters, such as subjective age of acquisition and imageability. The development of StimulStat has required extensive research and the computation of numerous parameters. It marks an important advance in web-based corpus design and represents an invaluable tool for psycholinguistic research.

As can be seen from the above, I assess the dissertation study by Dr. Slioussar very highly: It is innovative in its choice of the topic and uses cutting-edge psycholinguistic and neurolinguistic research methods. Crucially, each component of the dissertation study and each experiment, in particular, boasts an extremely rigorous fine-tuned design with testable predictions and control for all possible biasing factors. The conclusions rely on a sound research methodology that leads to significant and compelling findings. The novelty of the study is incontestable—the project investigates the role of such an underexplored construct as inflectional syncretism in morphological processing, feature markedness in gender and number agreement, and morphological regularity in verbal morphology both in production and perception. It offers new insights into the psycholinguistic mechanisms underlying agreement attraction and
addresses the role of information structure and scrambling in sentence processing. Based on my assessment of the study, I propose that Dr. Slioussar be awarded the degree of the Doctor of Science in Philology and Linguistics HSE with an honorable mention *cum laude*.

Full name Kira Gor

Academic degree/academic title Ph.D./Professor

Place of work University of Maryland

Position Associate Professor

E-mail kiragor@umd.edu