

Reviewer's Opinion

About

Iffah Syafiqah Suhaili: "EEG analysis of naturalistic viewing: From connectivity analysis to reliable extraction of neural components"

doctoral (Ph.D.) dissertation and theses

Introduction

First, I would like to thank the Doctoral School of Information Science and Technology, University of Pannonia for the honor of being asked to review this dissertation. It was a pleasure to gain a deeper understanding of the research being conducted at University of Pannonia.

The thesis was prepared for the award of a doctoral degree (PhD) within the framework of the Doctoral School of Information Science and Technology at University of Pannonia in the discipline of Computer Sciences

Iffah Syafiqah Suhaili studied at University of Pannonia, in the Department of Electrical Engineering and Information Systems under the supervision of Dr. Zoltán Juhász. The dissertation investigates how the brain organizes aesthetic perception during naturalistic art viewing and establishes methodological best practices for extracting reliable neural components from EEG.

I previously had the opportunity to review the first version of the dissertation as an official opponent during the internal defense. In my earlier review, I identified and described in detail the minor issues I had found in the doctoral dissertation, comprising 31 formatting-related issues and 4 logical issues. I am pleased to note that the author has taken my recommendations into consideration and has revised the dissertation with commendable thoroughness and attention to detail. The revised version reflects a substantial effort to address the issues raised in my previous review. In the following, and with an emphasis on conciseness, I evaluate the doctoral dissertation in accordance with the standard criteria for doctoral dissertation reviews and the specific requirements established by the Doctoral School.

General Assessment

Choice of Topic and Title

I consider the choice of topic to be interesting, useful, and highly significant, as Electroencephalography (EEG) measurements with their millisecond temporal resolution, are

indispensable today among medical data acquisition techniques, both in neuroaesthetics and in brain research.

In her doctoral dissertation, Iffah Syafiqah Suhaili provides a comprehensive account of her independent research, including its objectives, the relevant scientific literature, the research methods employed, and the principal findings obtained. These results are subsequently synthesized and presented in three thesis statements (Theses I–III).

The doctoral dissertation is written in English, in a fluent and readable style. The doctoral dissertation has total 130 pages (netto 92 without the bibliography, lists etc.), thus not exceeding the length limits prescribed by the doctoral program.

Synopsys

The doctoral candidate addresses the topic of efficient automatic processing of EEG measurement data, as well as the theoretical and methodological issues related to this topic. Following the introduction that frames the three central gaps (limited use of robust connectivity metrics, poor characterization of fixation-locked activity in free viewing, ICA usability and the need to validate ICA pipelines), Chapter 2 reviews conceptual and methodological foundations including EEG generation, volume conduction, oscillatory mechanisms, connectivity measures and ICA principles. Chapter 3 presents a sensor-space connectivity study comparing abstract and figurative paintings using time-resolved dwPLI and complementary spectral analyses. Chapter 4 focuses on fixation-locked dynamics and ICA reliability: it synchronizes high-precision eye-tracking with high-density EEG to identify lambda responses, demonstrates that ICA can recover physiologically plausible fixation-locked components, and systematically explores how preprocessing choices affect ICA stability. The final chapters (Chapter 5 and 6 and 7) synthesize empirical results with theory, discuss methodological implications for component-space connectivity, and offer practical, evidence-based recommendations for preprocessing and analysis pipelines. The dissertation combines rigorous methods with theory-driven questions, balancing detailed technical exposition with empirical contributions that advance both neuroaesthetics and EEG methodology.

Structural analysis of the dissertation document

The dissertation has seven chapters and a clear hierarchical structure: front matter, theoretical foundations, three linked empirical chapters, a general discussion, a conclusion, and a final chapter on scientific contribution. Its logic moves from broad motivation and methodological background to increasingly specific analyses of aesthetic perception, fixation-locked activity, and ICA reliability. The chapter structure is explicitly laid out in the table of contents, and each chapter includes its own introduction, methods or rationale, results, discussion, and conclusions where relevant. The last chapter provides a well written research summary; it enumerates Thesis I-III and lists related publications with matching chapters together. The dissertation contains 50

figures and 8 tables in total, and additionally Appendices A-F sections contains 4 figures and 4 tables.

Content and form strengths

Content strengths

- The dissertation has a clear research gap and problem focus: it addresses the limited use of robust connectivity methods, the uncertainty around fixation-locked neural activity, and the need to validate ICA in naturalistic EEG.
- The work is conceptually strong because the chapters build logically from theory to empirical studies and then to synthesis and future directions.
- It combines methodological rigor with substantive relevance by studying aesthetic perception using EEG during naturalistic art viewing, which is both timely and cognitively meaningful.
- A major strength is the integration of multiple analytic levels: sensor-space connectivity, fixation-locked activity, and ICA reliability, which gives the thesis breadth and coherence.
- The discussion appears to connect findings to broader theories such as aesthetic appreciation models and communication-through-coherence, which strengthens interpretation.

Form strengths

- The thesis is well structured, with a progression from introduction and foundations to empirical chapters, discussion, conclusion, and contribution to science.
- The writing uses a formal academic style and consistently explains technical concepts such as EEG, volume conduction, connectivity metrics, and ICA in a systematic way.
- Chapter organization is explicit, and each chapter appears to have a defined role, which helps the reader follow the argument.
- The dissertation uses figures, tables, and methodological explanations to support the text, which improves clarity in a technical topic.

The dissertation demonstrates strong scholarly quality through its clear identification of research gaps, coherent alignment between objectives and methodology, and well-structured progression from theoretical foundations to empirical analysis and synthesis. Its content is particularly strong in the way it integrates methodological rigor with a meaningful research problem, namely the investigation of EEG connectivity, fixation-locked activity, and ICA reliability in naturalistic aesthetic perception. The thesis also shows a high level of conceptual organization, with each chapter contributing logically to the overall argument and supporting a sustained, systematic line of inquiry. In terms of form, the writing is formal, technically precise, and appropriately academic, while the use of figures, tables, and chapter summaries enhances clarity and readability.

Content weaknesses

As noted above, I am pleased that the author has taken my previously suggested revisions into consideration and has revised the dissertation with commendable thoroughness and attention to detail. In my opinion, the revised version represents a significant improvement over the previous version. From my perspective, only a few additional comments remain, primarily concerning the formal aspects of the dissertation:

Overall suggestions for improvements

1. On page 49: “The beta band connectivity (**Error! Reference source not found.**) reveals significant connectivity differences across time points for both conditions. “
2. On page 75: To contextualize these single-trial dynamics at the scalp level, **Error! Reference source not found.** presents the corresponding lambda-locked ERP topographies.

Several points were already discussed during the home defense. Following the defense, I also received further written clarifications from the author, and the corresponding explanations and revisions have been incorporated directly into the dissertation. Taking into account all the information and clarifications provided to me, only a few minor questions remain:

1. Can we properly characterize the viewing session with global or window-based EEG measures (e.g. average power of a specific frequency band, average connectivity measures)?
2. The dissertation showed the use of ICA for detecting occipital lambda responses. Could this method be used for identifying other cortical activation sources as well? If so, what would be the benefit?
3. The lambda responses were detected during viewing paintings. Is the method generalizable to investigate other cognitive tasks, e.g. reading, programming, gaming?

Publication and citation summary table (from MTMT)

Two additional publications (2 abstracts) have been arrived into the publication list at MTMT since the previous evaluation period.

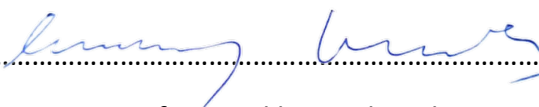
Suhaili Iffah Syafiqah binti munkásságának összefoglalása (2026.09.06)
MTMT közlemény és idéző összefoglaló táblázat

Tudományos közlemények	Szám		Hivatkozások ¹	
	Összesen	Részletezve	Független	Összes
I. Tudományos folyóiratcikkek	3		2	2
külföldi kiadású szakfolyóiratban idegen nyelvű		3	2	2
külföldi kiadású szakfolyóiratban magyar nyelvű		0	0	0
hazai kiadású szakfolyóiratban idegen nyelvű		0	0	0
hazai kiadású szakfolyóiratban magyar nyelvű		0	0	0
II. Könyvek	0		0	0
a) Könyv, szerzőként	0		0	0
idegen nyelvű		0	0	0
magyar nyelvű		0	0	0
b) Könyv, szerkesztőként ²	0			
idegen nyelvű		0		
magyar nyelvű		0		
III. Könyvrészletek	0			
idegen nyelvű		0	0	0
magyar nyelvű		0	0	0
IV. Konferenciaközlemény folyóiratban vagy konferenciakötetben	2		0	0
idegen nyelvű		2	0	0
magyar nyelvű		0	0	0
Közlemények összesen (I-IV.)	5		2	2
Abstrakt ³	7		0	0
Kutatási adat	0		0	0
További tudományos művek ⁴	0		0	0
Összes tudományos közlemény	12		2	2
Hirsch index ⁵			1	1
Oktatási mű	0		0	0
Felsőoktatási mű	0		0	0
Felsőoktatási tankönyv idegen nyelvű		0	0	0
Felsőoktatási tankönyv magyar nyelvű		0	0	0
Felsőoktatási tankönyv része idegen nyelvű		0	0	0
Felsőoktatási tankönyv része magyar nyelvű		0	0	0
Oktatási anyag	0		0	0
Egyéb oktatási művek	0		0	0
Ötletmi formák	0		0	0
Alkotás	0		0	0
Ismeretterjesztő művek	0		0	0
Folyóiratcikkek		0	0	0
Könyvek		0	0	0
További ismeretterjesztő mű		0	0	0
Közérdekű vagy nem besorolt jellegű mű ⁶	0		0	0
További közlemények ⁷	0		0	0
Egyéb szerzőségű mű ⁸	0		0	0
Idézők szerkesztett művekre			0	0
Idézők disszertációban, egyéb típusban			0	0
Összes közlemény és összes idézők	12		2	2

Summary

I consider the results to be valuable and well-substantiated with respect to all three theses. I accept the new scientific findings achieved by the candidate and described in the theses.

I recommend that the dissertation be submitted for public defense, and in the event of a successful defense, I support the awarding of the PhD degree.

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Budapest, 06.09.2026.

Prof. Dr. Miklos Kozlovsky

BioTech Research Center, Obuda University