Phenomenology and Cognitive Science, Embodied Cognition, Neuroscience, and Neurophenomenology

Ciubotaru Alexandra, 1st year
Master of Arts in Cognitive Science

1. Neubauer, B. E., Witkop, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. *Perspectives on Medical Education*, *8*(2), 90–97. https://doi.org/10.1007/s40037-019-0509-2

The article summarizes the branches and traditions of phenomenology and argues for their employment in improving medical education. The main take of the article is that research in medical education can benefit from the phenomenological method. In order to understand what is the lived experience of a physician in training, one needs to understand specific phenomena forming its essences. The article proposes that scientific inquiry shaped by phenomenology can aid in understanding phenomena like clinical reasoning, medical work-place learning, the relationship between attending physicians and residents, feedback and knowledge transfer.

In addition to explaining the transcendental and hermeneutic branches of phenomenology, the article mentions three contemporary approaches to phenomenology: lifeworld research (explores daily experiences in the *lebenswelt* of individuals, taking into account: selfhood, sociality, embodiment, spatiality and temporality), post-intentional phenomenology (phenomena are viewed as multiple, partial,contextual, in flux, being simultaneously produced and producing) and interpretative phenomenological analysis (detailed of the lived experience of a phenomenon through participant's personal experiences and personal perceptions of objects and events.

As a criticism and suggestion for improvement, one can say that if the purpose of the article was to introduce phenomenology as a research technique in medical education it should have brought more arguments, explanation and exemplified particularizations. While the description of the phenomenological traditions is very detailed and comprehensive, the

specific connections and implementation in medical education research are very weak. The article only vaguely suggested enquiries like:

> What is the experience of shame and the impact of that experience for medical learners ? What does it mean to be an empathetic clinician ? What is the medical learner's experience of failure on high stakes exams? How do experienced clinicians learn to communicate their clinical reasoning in professional practice?

2. Molokopoy, V.; D'Angiulli, A. Multidisciplinary Intersections on Artificial-Human Vividness: Phenomenology, Representation, and the Brain. Brain Sci. 2022, 12, 1495. https://doi.org/10.3390/ brainsci12111495

The article explores the concept of vividness from a multidisciplinary perspective, incorporating insights from artificial intelligence, cognitive psychology, neuroscience, and phenomenology. The authors review the existing literature and present the state of the art, advancements, and potential developments in the field of artificial-human vividness.

The article begins by discussing the symbolic approach to vividness, which emphasizes a direct correspondence between objects in the world and concepts in the knowledge base. This approach has been influential in artificial intelligence research, particularly through the work of Hector Levesque. However, critics argue that adhering strictly to this approach may limit the ability to store evolving or partial knowledge. Allowing for uncertainties and unknowns can enhance the capacity of the knowledge base to solve complex problems.

It then explores vividness from a cognitive science perspective, highlighting its phenomenological nature and the psychological and neurological differences between individuals who report vivid inner imagery and those who do not. They also emphasize the role of inner mental representations as an additional database that individuals can access to inform their decision-making.

Next, it examines attempts to integrate vividness within neural network approaches and the creation of artificial intelligence systems. Examples such as Aleksander's MAGNUS showcase the potential for AI with complex vividness, approaching a level of sentience that raises questions about consciousness. Additionally, the emergence of interactive robots like Spot raises ethical concerns regarding their consciousness, rights, and the safety implications for humans.

The authors conclude by emphasizing the importance of deepening our understanding of human and AI cognition to develop AI architectures capable of solving complex tasks. Achieving this requires a system that allows for internal state observation, which is facilitated by a vivid knowledge base and iconic transfer. However, this increased complexity also raises ethical and safety concerns. To address these challenges, the authors argue for the unification of cognitive sciences with AI to develop a better understanding of concepts such as vividness, intentionality, and consciousness. They propose a unitary notion of vividness as a potential lingua franca for psychologically-plausible simulation and modeling across disciplines dealing with reasoning and knowledge representation.

3. Halák, J. (2021). Embodied higher cognition: Insights from Merleau-Ponty's interpretation of motor intentionality. *Phenomenology and the Cognitive Sciences*, *22*(2), 369–397. https://doi.org/10.1007/s11097-021-09769-4

The article provides a thought-provoking analysis of the concept of embodied cognition and its implications for higher cognitive processes. Drawing upon the philosophical insights of Maurice Merleau-Ponty, the author delves into the intricate relationship between the body, mind, and cognition.

The article presents a comprehensive examination of Merleau-Ponty's interpretation of motor intentionality, which posits that our bodily actions are fundamental to our higher cognitive processes. It effectively elucidates the idea that the mind is not an isolated entity but intricately interconnected with the body. By delving into the concept of embodied cognition, the author emphasizes that our cognition emerges from our bodily engagement with the world. One of the notable strengths of the article lies in its ability to bridge the gap between philosophy and cognitive science. The author analyzes two cases, Schneider, a brain-injured war veteran, and Gerstmann's syndrome, a neurological disorder, to illustrate Merleau-Ponty's ideas. The article argues that "higher-order" cognition is impaired in Schneider due to limitations in sensorimotor capacity to produce complex differentiations of phenomenal structures. It further explores Merleau-Ponty's views on the role of the body and hand in cognitive processes and the embodied and enactive nature of symbol-based cognition. The article concludes by emphasizing the importance of embodiment in higher cognition and

how bodily mobility contributes to the structuring of our relationship with the world and symbolic systems.

4. Calì, C. (2022). Philosophical, experimental and synthetic phenomenology: The study of perception for biological, artificial agents and environments. *Foundations of Science*. https://doi.org/10.1007/s10699-022-09869-7

The article presents a discussion on synthetic phenomenology and its relevance to the study of perception in biological and artificial agents. It explores different perspectives and research programs, combining philosophical, experimental, and synthetic approaches. One strength of the article is its exploration of the relationship between perception, consciousness, and the structure of experience. It emphasizes the importance of understanding the phenomenal content of experience for both artificial and biological agents. By considering the perspectives of various researchers, such as Pylyshyn, Brooks, and Gamez, the article enriches the discussion and promotes interdisciplinary thinking.

However, the article could benefit from a clearer organizational structure. The ideas are presented in a somewhat disjointed manner, making it challenging to follow the flow of arguments. Providing a more coherent and logical progression of ideas would improve the readability and comprehension of the article. Furthermore, the article would benefit from a deeper analysis of the implications and potential contributions of synthetic phenomenology in the fields of AI and robotics.

Regarding interdisciplinary ideas, the article successfully integrates concepts from philosophy, AI, robotics, and the study of perception. By drawing on different disciplines, it offers a comprehensive understanding of synthetic phenomenology. However, further exploration of the interdisciplinary connections and more in-depth analysis of specific examples would strengthen the article's interdisciplinary approach.

5. Bogotá, J. D., & Djebbara, Z. (2023). Time-Consciousness in computational phenomenology: A temporal analysis of active inference. *Neuroscience of Consciousness*, *2023*(1). https://doi.org/10.1093/nc/niad004

This article explores the role of time in computational models of consciousness, specifically focusing on the active inference framework. The authors argue that while

computational models of consciousness typically have a sequential temporal structure, human experience is characterized by a continuous flow of time, proposing an integrating Husserlian temporality with a sequential order of time to achieve an integrated continuity of time in active inference.

The difference between subjective and objective temporality comes into discussion and it is emphasized the need for computational models to account for the continuous and dynamic temporal structure of human experience. It explores Husserl's analysis of time-consciousness, which involves the concepts of retention (intending the just-past), protention (intending the about-to-occur), and primal impression (intending the now-phase). The authors argue that these concepts provide a basis for understanding the continuous and flowing nature of time in human experience.

The active inference framework is introduced as a computational model that can capture the temporal structure of consciousness. Active inference is a corollary of the free energy principle and involves a generative model that infers the most likely causes of observed outcomes in a generative process. The authors analyze the temporal structure of active inference and propose an integrated continuity that combines subjective temporality and objective time. They demonstrate how the belief updating equation in active inference aligns with the phenomenological principles of time-consciousness.

6. Miceli McMillan R, Fernandez AV. Understanding subjective experience in psychedelic-assisted psychotherapy: The need for phenomenology. Australian & New Zealand Journal of Psychiatry. 2023;57(6):783-788. doi:10.1177/00048674221139962

The article explores the role of subjective experience in psychedelic-assisted psychotherapy and proposes a phenomenological research program to better understand the therapeutic effects of psychedelics. The authors argue that current research primarily relies on psychometric assessments and scales to measure the subjective experiences induced by psychedelics, but more nuanced and detailed descriptions are needed. They suggest drawing on phenomenology and phenomenological psychopathology to systematically investigate how psychedelic-assisted therapy alters subjective experience.

While the article presents an interesting perspective on the importance of subjective experience in psychedelic therapy, it has a few notable criticisms. Firstly, it overlooks the potential adverse effects and neurobiological modifications associated with psychedelic use.

Failing to consider these factors may result in neglecting irreversible negative effects and may not provide a comprehensive understanding of the therapy's outcomes. Secondly, the article assumes a gap between subjective experiences describable by phenomenology and their neural embedding. This presupposition disregards the potential interplay between subjective experiences and neurobiological mechanisms, which could be important for a holistic understanding of psychedelic-assisted psychotherapy, especially considering that their effects are primarily on the neural structures.

7. Nelson, B., McGorry, P. D., & Fernandez, A. V. (2021). Integrating clinical staging and phenomenological psychopathology to add depth, nuance, and utility to clinical phenotyping: A heuristic challenge. *The Lancet Psychiatry*, *8*(2), 162–168. https://doi.org/10.1016/s2215-0366(20)30316-3

One strength of the article is that it effectively bridges the gap between clinical staging and phenomenological psychopathology, demonstrating the potential for mutual enrichment between these approaches. The integration is presented as a means to capture the depth and nuance of psychiatric phenotypes, offering a "high resolution" clinical phenotype that can enhance personalized treatment decisions based on specific combinations of symptoms and their severity. In clinical settings, it can provide clinicians with a more nuanced and comprehensive characterization of patients, enabling them to make informed treatment decisions. From a research perspective, the integration offers a framework for investigating associations between illness stages, phenomenological disturbances, and symptom clusters, which could lead to the development of psychological and neurocognitive hypotheses regarding symptom etiology.

The article also highlights the availability of assessment tools such as the Examination of Anomalous Self Experience (EASE), Examination of Anomalous World Experience (EAWE), Bonn Scale for the Assessment of Psychopathology (BSABS), and AMDP System, which can facilitate the integration of clinical staging and phenomenological psychopathology. This acknowledgement of existing tools demonstrates practicality and feasibility in implementing the proposed integration.

8. Nelson, B.; Lavoie, S.; Gawęda, Ł.; Li, E.; Sass, L.A.; Koren, D.; McGorry, P.D.; Jack, B.N.; Parnas, J.; Polari, A.; Allott, K.; Hartmann, J.A.; Whitford, T.J. (2020).

The neurophenomenology of early psychosis: An integrative empirical study. Consciousness and Cognition, 77(), 102845–. doi:10.1016/j.concog.2019.102845

The article discusses the challenge of integrating various domains or levels of analysis in schizophrenia research and proposes a promising approach using minimal self-disturbance as an organizing principle. Minimal self-disturbance refers to fragility in the implicit first-person perspective, presence, and agency, which are core phenomenological features of schizophrenia spectrum disorders. The article presents the results of the first empirical test of a neurophenomenological model that links source monitoring deficits and aberrant salience to minimal self-disturbance.

Overall, the article contributes to the current knowledge by providing empirical evidence supporting the relationship between source monitoring deficits and minimal self-disturbance in schizophrenia spectrum disorders. It highlights the importance of integrating different levels of analysis and suggests potential avenues for future research to deepen the understanding of core phenomenological aspects of these disorders.

9. Joshua Bensemann;Michael Witbrock; (2021). *The effects of implementing phenomenology in a deep neural network . Heliyon, (), –.* doi:10.1016/j.heliyon.2021.e07246

This article investigates the use of Artificial Intelligence (AI) systems to model consciousness. Deep Neural Networks (DNNs) are enhanced to emulate aspects of consciousness by generating information representing multi-modal inputs. The study explores whether knowledge of the input's modality improves network performance. Simple representations of modality extracted from hidden layers aid other DNNs in classifying multi-modal data. The authors focus on functional properties rather than physiological mechanisms, aiming to understand the utility of limited forms of phenomenology in AI systems.

IN the model the DNNs are enhanced to emulate consciousness and investigate the benefits of knowing the input's modality. They train Hebbian learners to classify images or sounds based on hidden layer outputs, showing organizational changes during training. By providing one-bit information about modality to the models, they enable separation of modalities during classification tasks. The study explores limited phenomenology as a shortcut to important information and parallel processing as a way to incorporate phenomenal

systems. The challenges of modeling qualia are discussed, and the influence of context on decision making is considered. Overall, the main contribution is to the understanding of AI systems in modeling consciousness and the potential advantages of incorporating limited phenomenology.

10. Ramstead, M.J.D., Seth, A.K., Hesp, C. *et al.* From Generative Models to Generative Passages: A Computational Approach to (Neuro) Phenomenology. *Rev.Phil.Psych.* 13, 829–857 (2022). https://doi.org/10.1007/s13164-021-00604-y

The article proposes a way to bridge the gap between the neural neural processes and the phenomenological productions of consciousness through computational modeling. The phenomenological description of different levels of representation (eg: raw phenomenological data, the flow of lived experience, the constitution of an object as conscious percept) can serve as output data of a generative model –encoding (when the sensory model is given)-- and conversely given a certain phenomenological representation the sensory information that produced it can be inferred –decoding. The authors meticulously outline their approach, discussing the naturalization of phenomenology, evaluating philosophical objections, and positioning their version of computational phenomenology in the context of existing projects.

Central to the authors' computational phenomenology is the concept of "constitution," referring to the process by which subjects move from raw sensory data (hyletic data) to interpreted experiences (noema). They propose that this process can be modeled as an interpretive or inferential process, allowing the construction of generative models for various types of lived experiences. By leveraging generative modeling, the authors seek to explicitly outline the structures underlying the disclosure of lived experiences. They propose a computational model that generates the dynamics and structure of specific lived experiences, laying the groundwork for formal phenomenology.

11. Varela, F. J. (1996). Neurophenomenology: A methodological remedy for the hard problem. Journal of Consciousness Studies 3 (4):330-49.

The article introduces the concept of neurophenomenology as a methodological approach to bridge the gap between first-hand experience and cognitive sciences. The author

proposes a rigorous exploration of human experience through phenomenology and of the scientific results of cognitive sciences, aiming to establish mutual constraints and bridging explanations between subjective phenomena and objective cognitive sciences. He critiques views such as neuro-reductionism and functionalism, favoring a neurophenomenological perspective, considering the conscious experience irreducible.

Overall, the article is well-written and engaging. It introduces neurophenomenology as a promising methodological approach to study consciousness and addresses the limitations of other philosophical perspectives. The inclusion of case studies (in various domains of experience: attention, present-time consciousness and voluntary motion) enhances the practicality and relevance of the proposed approach.

12. Williford K, Bennequin D, Friston K and Rudrauf D (2018) The Projective Consciousness Model and Phenomenal Selfhood. Front. Psychol. 9:2571. doi: 10.3389/fpsyg.2018.02571

The article introduces and discusses the Projective Consciousness Model (PCM), which aims to provide a comprehensive theory of consciousness by combining a projective geometrical model of the perspectival structure of consciousness with a variational Free Energy (FE) minimization model of active inference. The PCM posits that consciousness is a process mediating active inference, allowing organisms to navigate and learn from the environment in an optimal manner. The article emphasizes the perspectival organization of consciousness, where diverse conscious perceptions are integrated into a coherent experience of the world from a first-person point of view.

However, the theoretical construction of the article borrows concepts from different fields and puts them together in an eclectic structure, without solid fundamentals for these interdisciplinary bridges. While projective geometry seems to be an interesting insight in the representational qualities of consciousness, the article lacks a detailed explanation of how projective geometry and variational Free Energy minimization are specifically linked to consciousness. The conceptual connections between these disparate fields are not well-established, and there is a lack of empirical evidence to support the claims made by the PCM.