REPORT

concerning the thesis titled

"Comparing theories of consciousness: Theoretical and methodological advances"

presented by

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In this work, titled "Comparing theories of consciousness: Theoretical and methodological advances", M. Del Pin aims to compare different theories of consciousness in light of continuing debates about the richness of perception. Some authors in the broad field of consciousness studies defend the idea that phenomenal experience oveflows access — perception is rich, but we can only report so much because of limitations in our ability to express reports, which is constrained by bottlenecks in our attentional and memory capacity. Other authors, however, defend the idea that perception is sparse — we think we see everything, but this belief is illusory. Strikingly, as M. Del Pin points out in the introduction, the very same experimental findings have been used to argue for the rich or the sparse views. One goal of the thesis is thus to design a paradigm that makes it possible for the views to be better distinguished from each other — this work is reported as a published article:

Del Pin, S. H., Skóra, Z., Sandberg, K., Overgaard, M., Wierzchoń, M. (2020). Comparing theories of consciousness: Object position, not probe modality reliably influences experience and accuracy in object recognition tasks. *Consciousness and Cognition*, *84*, 102990.

This empirical endeavour then leads M. Del Pin to engage in a meta-scientific reflection about how different theories should be compared. That work is reported in the thesis as:

Del Pin, S. H., Skóra, Z., Sandberg, K., Overgaard, M., Wierzchoń, M. (2021). Comparing theories of consciousness: Why it matters and how to do it. *Neuroscience of Consciousness*, *2021*(2*)*.

The thesis itself is disarmingly short, consisting only of a general introduction of ten pages that essentially offers a summary of the two articles cited above. The thesis lacks a general discussion or contextualized introductions to the two articles of which it consists. This compact format, while extremely unusual in the experience of this referee, nevertheless appears to meet the legal requirements for a Ph.D. thesis presented in Poland, and is therefore receivable.

In the **first article**, M. Del Pin and collaborators explore the empirical implications of three extant theories of perceptual awareness: Lamme's "Recurrent Processing Theory" (RPT), Kouider's "Partial Awareness Hypothesis", and Overgaard's own REF-CON theory. The three theories espouse different assumptions concerning the graded vs. binary character of conscious contents, the richness of perceptual contents, and the accuracy of one own's judgements about those contents. To distinguish between the different predictions that each theory makes, M. Del Pin develops an experimental paradigm in which participants are first briefly exposed to a circular array of eight images of objects, then given a probe about the location of a to-be-reported object, and finally asked (1) to choose which object had been presented at the probed location in a 2-AFC task in which the lure is a completely new object, and (2) to report on their visual experience using the Perceptual Awareness Scale. Crucially, the 2-AFC task can either involve object images, as in the array display, or words. The main results, obtained through sophisticated Bayesian General Linear Modeling methods, shows no difference between conditions: Participants achieve the same accuracy regardless of whether the 2-AFC task involves words or pictures. This is incongruent with the hypotheses of the Partial Awareness Theory. Surprisingly, accuracy and the PAS judgements are found to be influenced by position, with better

performance on the horizontal vs. vertical axis positions, and intermediate performance for the diagonal positions.

A second experiment then aims to correct some of the potential biases associated with the first. In particular, the authors note that the fact that the correct object is always presented in the 2-AFC task, which may offer a possibility for participants to reconstruct the presented object. This second experiment confirms the results of the first. The authors conclude that the data are inconsistent with the predictions of Partial Awareness, and can be accommodated by both REF-CON and RPT.

The **second article** builds on the first and consists of a theoretical contribution aimed at proposing criteria through which different theories can be compared. The authors begin by pointing out that most extant work in consciousness research is aimed at supporting a given theory rather than at comparing different theories — a significant hindrance to empirical progress. This crucially important observation echoes that of Yaron et al. (2021), who likewise lament the paucity of comparative research in consciousness studies. M. Del Pin then discuss the *strong inference* approach advocated by Platt, who advocated theory-driven rather than data-driven approaches in science. Critiques of this approach are then offered, which leads the authors to focus on the manner in which the experiments associated with the first article presented in the thesis were developed. On this basis they propose six steps to develop theoretical comparisons — a process that can serve as a blueprint for the ongoing "adversarial collaboration" initiatives funded by the Templeton World Charity Foundation, which the authors briefly mention in the discussion. Altogether, this theoretical article offers interesting discussion on the current state of consciousness research, which is characterized by a sort of uneasy statis out of which the field has to collectively pull itself out. The approach advocated by the authors is innovative and timely; the paper is important and will play a role advancing the field.

Overall, beyond its brevity, this thesis clearly demonstrates scholarship and ability to carry out both theoretical analysis as well as empirical work. M. Del Pin shows both experimental acumen as well as theoretical depth in developing this work. There is a little room for critical commentary: Both works reported in the thesis have been published and have hence been reviewed by experts in the field. This referee would have appreciated additional empirical work as there are many possible ways of expanding the work initiated in the two experiments reported in the first article, work that M. Del Pin is undoubtedly engaged in pursuing.

Altogether then, this short thesis demonstrates the candidate's general theoretical knowledge in the study of consciousness and the ability to conduct empirical research independently. It further offers an original solution to the nagging problem of comparing theories in consciousness research. The combination of a strong theoretical approach with astute empirical work is a strength of this work.

The work is thus acceptable as a Ph.D. thesis.

Brussels, 17/10/2021

Axel Cleeremans