

06 August 2021

RE: Zuzanna Skora

The thesis considers how perceptual experience as a conscious experience could be validly measured (mainly parts III and IV); and given such a measure, how consciously accessible perceptual information is in working memory but not focused on (part II). The candidate's review and use of the relevant literatures demonstrates her general theoretical knowledge to a very good scholarly standard; the eight experiments reported represent original solutions to problems posed by the existing literature. There is good evidence in the thesis of the ability to work independently; namely, the use of developing statistical tools, which she explores over the thesis, evolving more refined use of them over the course of experiments, which I take to be the mark of a keen young researcher exploring what might be best. A full view of her independence will of course become clearer in the viva. In sum, in my view the thesis clearly fulfils the requirements of a doctoral thesis.

One strength of the thesis is exploring different statistical techniques, showing the candidate's curiosity about what is really the best way of analysing data, and not being necessarily satisfied with the conventional solutions, such as traditional ANOVA. This bodes well for any future career as an academic, which I hope she takes up, as statistical tools are constantly developing. Experiments are also pre-registered; and for most experiments, the data are available on OSF. Both these features are very commendable engagement with open science practices, reflecting well on the candidate as a researcher.

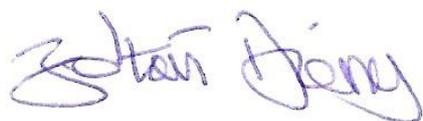
The candidate has been clear in her results sections about which analyses were pre-registered and which were not (“exploratory”) and interpretation has relied in large part on the pre-registered analyses (or if not, for stated reasons). As I said, the candidate has also explored different inferential procedures within a series of experiments, thereby illustrating her growth as a researcher over the course of the PhD. While both these practices are to be commended, it will pose a minor problem when it comes to publication, as they jointly conflict with the requirement to use a uniform inferential procedure over the set of experiments in a single paper, unless there are reasons intrinsic to the different experiments to do otherwise. One easy way out is to use as a uniform procedure the one regarded as best by the candidate but crucially in supplementary materials report all pre-registered analyses (and point out any conflicts in conclusions); this still adheres to the principle of open science.

The vast majority of researchers use significance testing as the inferential means of going from sample to population. The candidate uses Bayesian modelling for estimation, typically reporting credibility intervals. Then the credibility interval is used for hypothesis testing by deciding on whether the H_0 predicted parameter value is inside or outside the interval. This is not Bayesian hypothesis testing but significance testing. The probability distribution for population parameter values does not produce a probability for any particular parameter value, including not for the H_0 value: All particular parameter values have a probability of zero both for the prior before data are collected and for the posterior afterwards. This is the reason why determining whether 0 (or other H_0 value) is within or outside the credibility interval is not Bayesian: It is just significance testing. In particular, it cannot tell one whether 0 is or is not “credible” and cannot be used to declare support for H_0 . The candidate effectively acknowledges this in experiment 2 of Part II by using Kruschke’s ROPE procedure, i.e. by assigning probability to intervals rather than points, and having a null interval (the ROPE). Despite Kruschke’s presence in psychology as a methodologist, few psychologists actually use ROPE, and it is commendable that the candidate turns to this method, which is superior to significance testing against the H_0 of no effect, in being able to provide support for (an interval) H_0 . I would like to discuss with the candidate in the viva why ROPE or Bayes factors were not used more extensively, and how one defines a null interval, or model of H_0 and H_1 , in non-arbitrary ways. Bayes factors are the only way to get evidence for a point H_0 .

The candidate defends PAS as a valid measure of the quality of conscious perception. Does not PAS then measure conscious access? So if items in STM are accurately recognized as changed or not when a PAS of 3 or 4 is given, does that not show conscious access to those items? (And likewise if recognition is also above chance for a PAS of 1 or 2, does that not show a simultaneous limit on conscious access for stored information about those items?) Meta-d' shows PAS varies with accuracy and it being above zero also provides evidence for conscious access for those conditions. (But if performance were above chance when a PAS of 3 or 4 were given, but meta-d' were zero, might that not just show that conscious and unconscious knowledge had the same accuracy?) If meta-d' measures conscious access, and if meta-d' increases with d', this shows that the conscious access increases as stored information increases; but if meta-d' does not vary with d', this shows only that conscious access, which may be above chance, did not get even greater with more information. These are conceptual issues about measuring conscious access raised by the candidate's thesis, which I will ask her about in the viva, and which have implications for her conclusions.

In sum, the thesis amply satisfies the criteria of a doctoral thesis, while also raising, as it should, many issues for further discussion, both about statistical methodology and how we can get a handle on consciousness.

Yours faithfully

A handwritten signature in blue ink that reads "Zoltan Dienes". The signature is written in a cursive, flowing style.

Zoltan Dienes