CAN THE CONSCIOUS OBSERVER AFFECT THE COLLAPSE OF THE WAVEFUNCTION?

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Background: The current project aims to investigate the claims of Radin and colleagues (Radin et al., 2012, 2013 & 2016). Radin et al. claimed to have found evidence that double-slit interference, produced by photons passing through these slits, can be affected by human observers. In their studies, subjects received instructions on how they should try to affect interference patterns, e.g. 'try to reduce interference', and received feedback on how they were doing. Across several experiments, it was found that subjects could do so, to a highly significant degree. Other researchers (e.g. Guerrer, 2017) have aimed to replicate Radin et al.'s findings, but with mixed results. It should be noted though that one issue in these partially failed replications may have to do with non-optimal feedback to the participant and non-optimal subject selection. Specifically, Radin et al. found that experienced meditators were better at this task than non-meditators, presumably due to the low chance of success in the experiment.
We believe that it is crucial to try to replicate Radin et al.'s findings. After all, if these findings are indeed reliable than they could fundamentally alter our understanding of mind-matter interactions. Specifically, it would support the 'consciousness collapses' idea of the quantum measurement problem, i.e. the notion that probability quantum waves 'collapse' because of interaction with a conscious observer.

Aims: Across three experiments we aim to find evidence for, or against, the claim of Radin et al. that subjects, and then specifically experienced meditators, can affect interference patterns in a double-slit set-up. Experiment 1 is a direct replication, Experiment 2 employs EEG to correlate mental state (as measured by EEG) and ability to affect interference patterns. Finally, in Experiment 3 we test if subjects are better at controlling photons that are entangled with matter in cortical areas.

Method: In all experiments we employ a coherent laser source that emits near infrared light (wavelength = 785 nanometer). This light is then sent through two slits (500 micron apart, width of each slit: 100 micron) and the pattern is recorded by a highly efficient (quantum efficiency in the near infrared spectrum ~80%) camera. The whole set-up is placed on a honeyboard breadcomb which is placed on a vibration-free table. The laser is controlled by a laser diode driver, which, in turn, is controlled by a desktop. The output of the laser is sent to the same desktop which is connected to an output screen. The desktop employs MatLab to control both the driver and the output to the screen. All materials, except for the desktop, the screen and the software on the desktop were bought at Thorlabs. We are currently in the process of recruiting experienced meditators. Although this is challenging we have made good progress. We are in contact with organizations for meditation through Ruben Laukkonen and Heleen Slagter, who collaborate closely with these organizations. So far, both Laukkonen and Slagter and the meditation organization are enthusiastic about participating in this project. We expect to start collecting data within a few months (hopefully before May 1). Before we start data collection all hypotheses will be pre-registered. We will employ Bayesian statistics to

analyze the results. Thus, we can quantify evidence for, and against, the tested hypothesis. The total costs so far have been ~10k for obtaining the materials and building the set-up.

Preliminary results: Since data collection has not yet started, we do not yet have any results.

References:

Guerrer, G. (2017) Consciousness-related interactions in a double-slit optical system.

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