Burns and McIntosh describe their attempt to replicate our paper from 2022 in Cortex (Strauch, Romein, Naber, Van der Stigchel & Ten Brink), where we introduced the, what the authors call, split-field pupillometry task (which is a great name!), and where we showed that the pupil responds stronger to the brightness on the left than to the brightness on the right, indicating pseudoneglect. Burns and McIntosh, however, find *right*ward not leftward biases in pupil light responses. As they tracked the right eye, whereas we tracked the left eye in our Experiment 1, this suggests that effects of our original Experiment 1 are likely confounded by the differences in illumination to the eyes rather than attention. The authors went further by reanalyzing our old data, reproducing the overall leftward bias we observed using the average of both eyes in Experiment 2, which suggest that both attention and a physiological explanation contributed to the effects reported. As the left eye here showed a substantial leftward bias in Exp 2 whilst the right didn't (resulting in overall leftward bias), this shows an important issue in the split-field pupillometry task: the average of both eyes has to be taken to investigate pseudoneglect. The authors clearly applied rigor in their replication attempt and we think that this manuscript will be helpful in developing the earlier proposed method further. Yet, we have a couple of points that will align the original and the now preregistered replication attempt more closely and will be necessary to allow for a closer replication than the original data reported here.

- As an exploratory analysis (we would leave this to the authors), we would be curious whether sensitivity is different if a longer interval is used instead of the constriction amplitude alone. In our second paper (with patients; Ten Brink et al., 2023) we found better sensitivity when considering more data points.
- About the inclusion of a vertical condition in our paper, it is stated that "Strauch and colleagues had used this as a 'control condition' in their second experiment, perhaps on the assumption that there would be no bias for the vertical dimension." However, we were aware that (very strong) effects were to be expected (described as pupil anisotropies). We did not focus on these, as the vertical condition was merely added as a sanity check, to confirm the absence of a correlation with the left-right greyscales bias. This was, unfortunately, not clearly communicated in our paper so we understand the interpretation of the authors. That being said, we did not assume an *attentional* bias towards the upper field. Attention might contribute here, but anisotropies in receptors or visual areas in the brain should not be overlooked here as potential contributors. For instance, the SC is topographically organized in a way that might contribute to such anisotropies (Wang & Munoz, 2018, PNAS; reviewed in Strauch, Wang, Einhäuser, Van der Stigchel & Naber, 2022, TINS on page 643).
- Related to this, for H3, it would be interesting (and extending the experiment beyond a replication) to add a rotated version of the greyscales task that allows to assess attentional up/downward biases. These could then be correlated with the up/down differences in pupil constriction. Whilst this doesn't imply that all anisotropies in the light response are due to attention, any covariation with the greyscales task could establish such attentional differences for the upper/lower fields (even though, as the authors correctly state, the eyes are not vertically centered).
- The distance from eye position to monitor is different in the currently described study (79cm) from ours (67.5cm). This is important as pseudoneglect is described to diminish or even flip from left to right with more leftward biases reported closer by (e.g., Heber, Siebertz, Wolter, Kuhlen, & Fimm, 2010, Brain and Cognition). An adjustment to the same distance seems therefore sensible. Similarly, the monitor should be of a similar size as the original monitor to control for possible effects induced by the stimuli covering larger/smaller

parts of the visual field. Reduced leftward biases at further distances could otherwise be an indication that the split-field pupillometry task captures pseudoneglect.

- It should be discussed whether the tower mount tracker results in restricted view to the periphery and additional reflections relative to the table-mounted tracker we used in both Cortex papers.
- The authors state the number of trials that must be absolved per stimulus. We assume that these will be presented in random order across conditions, as in our original paper. This should be described.
- It should be described whether age-restrictions are taken as an inclusion criterion. Preferably, the sample should be roughly age-matched as in the original study of Strauch et al. (2022). In the study of Ten Brink et al. (2023) the healthy control group was (partially) of older age than the group in the study of Strauch et al. (2022), and in Ten Brink et al., (2023), we found increasingly less leftward and more rightward pupillometric pseudoneglect estimates (albeit not significant) – in line with the literature on age-effects seen on others measures of pseudoneglect.
- If the hypothesis on at least partial anisocoria is correct (looking at the reanalysis of our data and the data put forward for the right eye here, we would not be surprised), this necessitates caution when interpreting the effect sizes in two of our papers. Besides the Strauch et al. (2022) paper, where effect sizes might be *over*estimated, this would also imply that the effect size for the dissociation between patients with neglect and controls in Ten Brink et al. (2023, Cortex) would be *under*estimated. The latter as we here tracked the left eye for patients (with assumed rightward attentional bias) and the average of both eyes for controls. In our opinion, a short discussion hereof might also benefit those intending to use the method to assess neglect in clinical populations.

Signed,

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