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LETTER TO THE EDITOR

Reply to: Mallett unit or fully fusionable images for prisms against asthenopia?

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Binocular vision;
Fixation disparity;
Aligning prism visión binocular;
Disparidad de fijación;
Prisma de alineación

For measuring fixation disparity or the aligning prism, clinicians may use the Mallett Unit with stationary presented dichoptic nonius lines.[1] Two recent Letters to the Editor[2,3] referred to the practical question whether dichoptic targets may perhaps distort the measurement.[4] In this debate, earlier research on sensory and motor aspects of fixation disparity may be helpful.[5]

If sensory perception of dichoptic targets were problematic, changes in the nonius presentation may modify the results. One modification is to flash the nonius lines only briefly for 100 ms in a series of trials. Flashed versus continuous nonius lines were compared and found to give similar results, as long as nonius lines are close to a central fusion stimulus, as it is in the Mallett Unit.[6] The visual presence of dichoptic targets was reduced even further in a laboratory device[7]: the binocular target was optically overlaid by a pair of flashed red point-light sources (LEDs covered by 3.4 minarc pin-holes), that were not perceived as part of the binocular target. Nevertheless, fixation disparity (mean ± SD = - 1.2 ± 1.1 min arc) was similar as in clinical studies with the Mallett Unit. Thus, these modifications of the temporal or spatial presentation of dichoptic targets in near vision had no effect.

The motor aspect of fixation disparity can be assessed with eye-trackers for measuring the angular amount of the deviation of the visual axes from bi-centric fixation, referred to as objective fixation disparity, since no sensory, i. e. subjective, nonius judgement is involved. The eye-tracker study in far vision of Schroth, Joos and Jaschinski[8] included two test conditions which are relevant here: (1) a "Mallett like arrangement" included dichoptic nonius lines and (2) a "Nonius bias arrangement" had binocularly presented nonius lines. Fig. 4 in Schroth et al.[8] showed very similar inter-individual distributions of the objective fixations disparity in the "Mallett like arrangement" versus the "Nonius bias arrangement". Reanalysis showed no significant difference between the means ± SD (11.9 ± 15.8 versus 17.1 ± 17.2 minarc, t_{paired} =0.17, inter-correlation r = 0.70, n = 22, 2 missing values). When the participants wore prisms, again no significant difference appeared (10.2 ± 19.0 versus 18.1 ± 15.2 minarc, t_{paired} =0.001, inter-correlation r = 0.87, n = 24). The significant inter-correlations ($p < 0.001$) confirm the reliability of these eye-tracker recordings. Thus, objective fixation disparity was the same, irrespective of whether nonius lines were presented dichoptically or binocularly.

These three previous experiments provide no evidence that the presence or the way of presenting dichoptic targets have an effect on the measurement of subjective or objective fixation disparity.

In generally, the self-selected prism approach[4] relies entirely on the observer's sense of comfort when viewing a binocular target for a brief testing period. A more comprehensive approach would be based on a physiological model and determine the relevant binocular functions to be confirmed in the clinical context. The ultimate goal would certainly be comfortable vision, but also efficient reading and long-term acceptance of prisms. Some steps on this long road have been taken in recent studies.[9,10]

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Wolfgang Jaschinski

Leibniz Research Centre for Working Environment and Human Factors at the Technical University of Dortmund, Dortmund, Germany
E-mail address: jaschinski@ifado.de