

Throughout the years, The Observer has proven to be applicable to more fields than biology and psychology alone. An excellent example is the research performed by Dr. Giorgio Porro at the Department of Ophthalmology of Utrecht University Hospital (the Netherlands). He and his colleagues have used The Observer Video-Pro to validate a newly developed test to determine the width of the visual field of neurologically impaired children. These are children who suffer from any kind of brain damage, due to e.g. cerebral hemorrhage or an infarction.

THE BEFIE TEST

To assess the width of someone's visual field, it is common practice to present the person with a 'peripheral stimulus': an object moving from outside the visual field into view. As soon as the object is detected, (s)he has to react to it with 'stimulus-directed behavior': a verbal answer, smiling, nodding, grabbing or pointing at the stimulus. However, the visual field of neurologically impaired children has to be assessed in quite a different way, since they may not be able to react with stimulus-directed behavior because they lack certain functions, such as speech or the ability to move some of their limbs. To assess the visual field of these children, a new behavioral visual field test (BEFIE: BEhavioral visual FIEld screening test) was designed. In this test, an examiner rotates an arc with a ball attached to its tip around the subject's head, from the periphery towards the center of the visual field (see figure 1). The angle at which the subject first detects the presence of the stimulus (in this case the ball), determines the size of the visual field. The purpose of the current research project was to determine whether or not detection of the stimulus can just as well be ascertained by mapping eye movements as by logging stimulus-directed behavior.



Figure 1. Dr. Porro rotating the arc around a subject's head.

EYE MOVEMENT AND STIMULUS-DIRECTED BEHAVIOR

Since neurologically unimpaired people both move their eyes and can react with stimulus-directed behavior upon an object coming into view, there may well be a relationship between the two behaviors. To find out if there is indeed such a relationship, eight neurologically unimpaired subjects (6 children and 2 adults) were instructed to react immediately at seeing a peripheral stimulus with a stimulus-directed behavior. Thus, a reaction was obtained indicating that the subject had noticed the peripheral stimulus of the BEFIE test. At the same time, two video

cameras made close-up, time-coded registrations of the subject's eye movements. The video recordings were coded at single-frame accuracy using The Observer Video-Pro. Registrations were made of the start of the presentation of the peripheral stimulus, the eye movements of the subject towards the peripheral stimulus at the correct meridian (i.e. in the right angle), spontaneous looks, as well as any other stimulus-directed behavior.

DATA ANALYSIS

After the observational data had been collected, several quantitative measures were computed with The Observer. To improve the validity of the results, five subjects were scored twice with an interval of one day. The Reliability Analysis module was used to establish the mean intra-rater reliability. With the Lag Sequential Analysis module, the sequential relationship between eye movements and the start of the presentation of the peripheral stimulus was established. For most subjects, the frequency of eye movements following the start of the peripheral stimulus corresponded to the frequency of stimulus-directed behavior following the eye movements. Therefore, most trials confirmed that a directionally-appropriate eye movement followed the start of the presentation of the peripheral stimulus. These results, together with the fact that 92% of the directionally-appropriate eye movements were confirmed by accurate stimulus-directed behavior, lead Dr. Porro to conclude that eye movement is a useful behavior to establish that a subject has noticed the stimulus.

CONCLUSION

In conclusion, the fact that eye movements can be used by ophthalmologists as a functional behavior indicating the perception of an object encourages the application of the BEFIE test on those children who show good eye movements but may not be able to point at the peripheral stimulus. The BEFIE test measures in a simple way behavioral reactions to a peripheral stimulus. Therefore, it may be useful for peripheral visual field assessment of neurologically impaired children who can not be tested by standard or simplified perimetry techniques. We are proud that The Observer Video-Pro has contributed to this significant step forward in medical research.

REFERENCES

1. Porro, G. (1998). *Vision and Visual Behaviour in Responsive and Unresponsive Neurologically Impaired Children*. Ph.D. Thesis, Utrecht University.