The Effect of Fatigue on Eye Movements and Metaphor Compresion in Reading

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A controversial question in research on processing metaphorical language is the analysis of processing time. Different models have been proposed without reaching a consensus regarding core processing properties and their temporal dynamics (Brisard et al., 2001; Gibbs, 1992; Glucksberg, 2013; Bowdle & Gentner, 2005).
The methodological framework of the current study is based on eye movement analysis (cp. Just & Carpenter, 1980). Our main research perspective is to explore the possible impact of the metaphorical content on the characteristic eye movements in reading. Additionally, we analyze impact and interference of fatigue on the metaphor comprehension.
Three different texts, containing (a) simple, (b) complex or (c) no metaphors were used as experimental stimuli. Eye movements were recorded using IViewX Hi-Speed system. Our results indicate that (1) average processing time is shorter in fatigued participants and (2) contrary to non-fatigued participants the shortest fixation times are observed when reading text without metaphors. Comprehension was not affected by complexity of the text or the level of fatigue.
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The relation between reading skills and eye movements in German-speaking adolescents: A function of reading mode?

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We aimed to investigate how reading skills correlate with eye movement patterns as a function of reading mode (reading silently vs. reading aloud) in German-speaking individuals. Eye movements of 22 adolescents (14 females; mean age = 13;6 years;months) were tracked while reading an age-appropriate text with 150 words silently and aloud. Reading skills were determined by means of a standardized test assessing speed and comprehension during silent reading (Lesegeschwindigkeits- und -verständnistest für Klassen 6−12).
Better reading skills were associated with an increased efficiency of eye guidance during silent reading, but not necessarily when reading aloud. During silent reading, reading speed correlated with various spatial and temporal eye movement parameters; reading comprehension was primarily associated with spatial parameters. When reading aloud, the association between reading skills and eye movements was attenuated: reading speed was only related to saccadic amplitudes; reading comprehension correlated with the number and amplitudes of saccades. Interestingly, gaze duration and the number of regressions did not correlate between reading modes.
Our results suggest that silent reading skills correlate with a broad range of eye movement parameters in German-speaking adolescents when reading silently. When reading aloud, reading skills are only associated with a restricted number of eye movement parameters.

Monocular and binocular calibrations in evaluating fixation disparity with video-based eye-tracker

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When measuring fixation disparity, the question arises as to whether monocular or binocular calibration is more precise and physiologically more appropriate? The aim of this study was to test the accuracy of monocular and binocular calibration and to evaluate the effect of the calibration procedure on the measurement of fixation disparity if video-based eye tracker is used. The results showed that the accuracy of calibration is not systematically different for pre- versus post-calibration and is not affected by the spatial characteristics of calibration targets. However, monocular calibration showed less accurate calibration results compared to binocular calibration. Excluding inaccurate calibration results, we observed that fixation disparity measurements have larger dispersion after monocular calibration. Four out of ten participants had significantly different individual fixation disparities with the two types of calibration procedures; typically, the monocularly-calibrated fixation disparity was larger than the binocularly-calibrated fixation disparity. The monocularly-calibrated fixation disparity was stronger affected by the heterophoria as compared to the binocularly-calibrated fixation disparity. We conclude that monocular calibration produces a physiologically more plausible fixation disparity.
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The influence of optometric and other parameters on binocular eye movements

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Purpose: To investigate the influence of optometric and other parameters on binocular eye movement coordination, i.e. fixation disparity (FD) in reading tasks.
Methods: 20 participants (mean age 25.4y +/-4.29y from 21y to 39y, 6 male, 14 female) were submitted to a classical optometric procedure; relevant optometric data were meas-ured. These participants underwent reading tests and eye movements were registered by using a RED500 eye tracker. Reading tests were performed under various conditions of reading distance (50 cm and 100cm) and background illumination (dark and bright)..
Results: Significant optometric and non-optometric factors were found. Working distance, background illumination and their interaction are statistically significant (working distance: $F=22.2$, $p<.0001$; background illumination: $F=10.0$, $p=0.0017$; interaction working distance and background illumination: $F=22.6$, $p<.0001$). Optometric parameters were also found to be statistically significant. Best quality of statistical models was obtained by using "vergence flexibility" for modelling FD. (vergence flexibility: $F=7.54$, $p=0.014$)
Conclusion: Binocular coordination is a complex function of various non-optometric and optometric parameters. If studies of binocular coordination using eye tracking methods are performed non-optometric and optometric parameters as well are important and should be accounted for. Neglecting these parameters may lead to insufficient statistical models or may mask other important parameters.