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Influence of bottom-up and top-down processing on eye movement parameters in horizontal scanning tasks

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Horizontal gaze transfer in scanning tasks depends on cognitive and reflexive components of processing. Response to onset of peripheral stimulus is mostly reflexive. If stimulus consists of equally big dots arranged in horizontal lines, the importance of reflexive component in gaze transfer diminishes. Cognitive component can be increased by adding linguistic content to the stimulus and making the task similar to the scanning in reading. Monocular eye movements were recorded during different horizontal scanning tasks. Mean fixation times for individual participants and in group were shortest (250ms) in reading artificially constructed text where the angular distance between the first letters of the words were 1.9o. Longest mean fixation times (up to 720ms) were observed in gaze transfer between two equal dots located in 1.9o distance. By changing the amount of cognitive component in stimulus for scanning, the eye fixation times alternate between the shortest and longest limits. The average saccade amplitudes were largest in scanning two dots (1.9o). In sequential horizontal scanning task mean amplitude go down to 1.75o, simultaneously the increased number of small amplitude saccades (<1.60) was observed. This indicates that gaze transfer in scanning tasks can be directed by stimulus outline and adding linguistic meaning to it.

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