In the eye of the test taking author: Measuring ESL students cognitive processing during receptive/productive comprehension tasks using eye-tracking technology

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Abstract
In this paper, we consider the value of using eye-tracking technology, in combination with stimulated verbal feedback and a cognitive load questionnaire, to explore cognitive processing of ESL students engaged in a comprehension task measuring receptive and productive abilities. Eye-tracking technology is increasingly being used in linguistic and applied linguistic research (see Godfroid et al., 2013) and is heralded for offering a view into the mind of subjects like language users (Rayner 1978:618; PickeringFrisson, McElree and Traxler, 2004). Recent innovative research (e.g. Pelicier-Sanchez, 2015; Bax, 2013; Bax & Weir, 2012; Smith, 2012) suggests that eye-tracking can be used fruitfully to investigate questions about the processing of longer text.

Departing from studies by Bax (2013), Bax and Weir (2015) and Brunfaut and McCray (2015), we mainly followed a quantitative research design supported by qualitative data. For this paper we present phase 2 results for 15 ESL students and report on what eye-tracking technology combined with stimulated verbal protocols reveal about ESL learners' strategies when they engage in summarising a passage and answer comprehension questions. We recorded their eye-traces using RED500 eye-tracking technology. In addition, we collected qualitative data by 1) using the Likert scale designed by Leppink, Plaas, Vleuten, Van Gog and Van Mierenboer (2013) for measuring different types of cognitive load in terms of individual experience; and 2) eliciting stimulated verbal reports. Results suggest, for example, that those students who performed well on the comprehension test items (shorter items that require skimming and scanning) did not necessarily perform well on the summary writing task (which requires careful reading for understanding), and vice versa. Also, students who performed better on the summary writing task tended to spend more time gazing in the designated ROI than weaker performing students. This confirms the assumption that stronger readers are more able to identify critical areas of information in a text than weaker readers, who presumable expend energy on individual word processing rather than overall comprehension. Furthermore, in some cases a longer fixation time on a more difficult comprehension item may not necessarily coordinate with poorer performance on that item. This suggests that better readers may spend more time processing linguistic features in order to ensure successful performance than weaker students. This appears to contradict the general assumption that weaker learners spend more time processing a reading task than more proficient readers.

Keywords: eye-tracking; stimulated verbal protocol; ESL reading and writing; ESL careful reading abilities; text measurement; reading strategies; writing strategies