

## Chapter 13

# Using Eye Movement to Study Adolescents' Comprehension of Visual Texts

**Paula Wolfe**

*University of Phoenix, USA*

### **ABSTRACT**

*This research used eye movement tracking to study the ways adolescents decode and comprehend multimodal texts. The focus is on eye movement regression between text and picture to investigate how participants use the two-stage information-processing model when attempting to comprehend visual texts. Ten adolescents ranging in age from 14 to 19 were asked to read a series of different types of visually based texts. Specifically, they read six short excerpts from graphic novels that varied widely in the complexity of both textual and visual features. The narratives included graphic novels, graphic retellings of canonical texts, and wordless visual texts.*

Visually based texts have become a dominant form of literacy in the multimedia environment of the digital age. Today's educators must devise ways of teaching visual literacy, and to do so, they must themselves understand the processes underlying comprehension of visual texts. This project seeks to deepen this understanding, using eye movement tracking to study the ways adolescents decode and comprehend visual texts. Although eye movement tracking is well established as a technique for investigating the comprehension of written texts, we are aware of no studies that have mapped the eye movements of readers of visual texts (Paulson & Freeman, 2003). The findings provide important insights into the design, process, and practice of literacy instruction for adolescents in the new generation, laying a foundation for new theoretical and practical understandings of the teaching of visual texts.

DOI: 10.4018/978-1-5225-2808-1.ch013

## **THEORETICAL FRAMEWORK**

This research utilized the two-stage theory of information processing developed by Carroll, Young, and Guertin (1992). Originally proposed to account for eye movements during reading performance, this theory posits that readers use one of two types—or stages—of reading processes, depending on the difficulty of the text. The theory further proposes that the two stages can be distinguished by different patterns of eye movements. Stage 1 processing, involves a simple, literal interpretation of text that is relatively easy to comprehend and is characterized by brief fixations<sup>1</sup> and few inter-sentential regressions.<sup>2</sup> Stage 2 processing, which involves solving problems encountered with increased text complexity, is characterized by long deep-processing fixations and more inter-sentential regressions. In this research, the focus will be on eye movement regression between text and picture to investigate how participants use the two-stage information-processing model when attempting to comprehend visual texts.

## **RESEARCH QUESTIONS**

The central research question is: When participants are asked to comprehend more and less complex texts, how do their eye movements reflect how text and visuals interact during this process?

The current project drew its inspiration from research on the relationship between eye movements and information processing during reading. The study of eye movement has a long history (O'Regan, 1990), and there is a substantial body of research on eye movements while viewers are engaged in reading (Huey, 1908/1969; Just & Carpenter, 1980; Justice & Landford, 2009; Rayner, 1978, 1998). One consistent claim in this field is that eye movements are influenced by textual variables (Rayner, 1998). Research has shown that as text becomes conceptually more difficult, fixation duration and regression frequency increase, while saccade<sup>3</sup> length decreases (Rayner & Pollatsek, 1989). Carroll and Slowiaczek (1987) proposed that there are two modes of eye movement while people read extended texts: a normal processing mode and a search and problem-solving mode. In the first, eye movements are under the control of an automatic lexical encoding process, with few inter-word regressions. In the second, movements are under the control of top-down processes, with longer fixations and more regressive fixations.

The measurement of eye movements has been found to be a useful tool for studying the implicit processes involved in information processing. In particular, visually guided scan paths mirror the different levels of processing (Zihl, 2008). However, in the literature on eye movement during reading, we have found few studies that map the eye movements of readers of visual texts. The data resulting from this project shows how readers comprehend visual text and will provide information to teachers regarding what parts of visual reading must be scaffolded.

## **MODES OF INQUIRY AND DATA SOURCES**

The work of Carroll et al. (1992), discussed earlier, showed that the more complex the task, the more likely readers are to move from basic literal interpretation into deep problem-solving processing modes. This finding raises the question of what relationship exists between complexity and comprehension in the reading of visual texts. For example, do readers use visuals to support their comprehension of text

12 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/using-eye-movement-to-study-adolescents-comprehension-of-visual-texts/187335](http://www.igi-global.com/chapter/using-eye-movement-to-study-adolescents-comprehension-of-visual-texts/187335)

## Related Content

---

### Teaching Preferences of International Students: A Review of STEM and Non-STEM Student Perspectives

Clayton Smith, George Zhou, Michael Potter, Deena Wang, Fabiana Menezes, Gagneet Kaur and Habriela Danko (2021). *International Journal of Technology-Enabled Student Support Services* (pp. 37-55).

[www.irma-international.org/article/teaching-preferences-of-international-students/308463](http://www.irma-international.org/article/teaching-preferences-of-international-students/308463)

### Gaming and Simulation in Public Education: Teaching Others to Help Themselves and Their Neighbors

Kevin Daniel Kupietz (2021). *Simulation and Game-Based Learning in Emergency and Disaster Management* (pp. 41-62).

[www.irma-international.org/chapter/gaming-and-simulation-in-public-education/276170](http://www.irma-international.org/chapter/gaming-and-simulation-in-public-education/276170)

### Monitoring the Quality of the Education System in Russia: Analysis of Regional Regulatory and Legal Documents

Inna Chaiko and Svetlana Dovbysh (2023). *Contemporary Challenges in Education: Digitalization, Methodology, and Management* (pp. 132-145).

[www.irma-international.org/chapter/monitoring-the-quality-of-the-education-system-in-russia/333214](http://www.irma-international.org/chapter/monitoring-the-quality-of-the-education-system-in-russia/333214)

### iPad Usage and Appropriate Applications: K-12 Classroom With a 1-to-1 iPad Initiative

Julia Bennett and Fan-Yu Lin (2018). *Online Course Management: Concepts, Methodologies, Tools, and Applications* (pp. 768-795).

[www.irma-international.org/chapter/ipad-usage-and-appropriate-applications/199240](http://www.irma-international.org/chapter/ipad-usage-and-appropriate-applications/199240)

### Pre-Service Teachers' Perceived Relevance of Educational Technology Course, Digital Performance: Teacher Perceived of Educational Technology

Ogunlade Bamidele Olusola and Bello Lukuman Kolapo (2019). *International Journal of Technology-Enabled Student Support Services* (pp. 41-54).

[www.irma-international.org/article/pre-service-teachers-perceived-relevance-of-educational-technology-course-digital-performance/236073](http://www.irma-international.org/article/pre-service-teachers-perceived-relevance-of-educational-technology-course-digital-performance/236073)