# Investigating reading strategies of secondary school students during reading comprehension tasks: Evidence from eye tracking data*

Spyridoula Stamouli, Ioanna Antoniou-Kritikou & Vassilis Katsouros
Institute for Language & Speech Processing, "Athena" Research Centre
pstam@athenarc.gr, agianna@athenarc.gr, vsk@athenarc.gr

*Περίληψη*

*Η παρούσα πειραματική μελέτη αξιοποιεί τη μεθοδολογία καταγραφής της οφθαλμοκίνησης, για να διερευνήσει τις στρατηγικές που εφαρμόζουν οι ελληνόφωνοι μαθητές Γυμνασίου κατά την ανάγνωση κειμένων με σκοπό την απάντηση σε ερωτήσεις κατανόησης. Η πειραματική διαδικασία περιλάμβανε την ανάγνωση τριών κειμένων με παράλληλη καταγραφή του βλέμματος. Η επίδοση των μαθητών συσχετίστηκε με την αναγνωστική τους συμπεριφορά, όπως αυτή αποτυπώθηκε στη βλεμματική τους συμπεριφορά, σε δύο συνθήκες: α) πρώτη ανάγνωση του κειμένου και β) ανάγνωση για την απάντηση στις ερωτήσεις κατανόησης. Από την ανάλυση προέκυψαν διαφορετικοί τύποι αποτελεσματικής και μη αναγνωστικής συμπεριφοράς, τα χαρακτηριστικά των οποίων αναλύονται με βάση συγκεκριμένες μετρικές οφθαλμοκίνησης.*

*Λέξεις-κλειδιά: κατανόηση ανάγνωσης, εργοκατευθυνόμενη ανάγνωση, στρατηγικές ανάγνωσης, οθφαλμοκίνηση, αναγνωστικός αλφαβητισμός*

## 1 Introduction

Reading comprehension is a complex language skill, combining various competences, which include reading fluency, syntactic processing, pragmatic and vocabulary knowledge and inferencing. It is thus a particularly sensitive indicator of overall language development in educational settings. For this reason, reading comprehension has been integrated in formal and informal assessment procedures, such as students' academic performance assessment programmes, as well as evaluation protocols for reading literacy skills and learning difficulties.

The present study seeks to explore the strategies employed by secondary school students in the context of performing reading comprehension tasks and, thus, falls within the scope of two research areas: experimental reading literacy research and assessment research. Reading literacy is defined as the ability to understand and use various types of texts for personal and social purposes (OECD 2009), which is essential for coping with everyday situations involving reading activities. Especially in educational settings, answering questions from texts is an assessment and instructional activity frequently used at school. In this situation, the goal is to comprehend and use textual information that is relevant to a particular task. Readers' interaction with texts during specific tasks, which involves moving between text and questions until the task is properly completed, has been described by the researchers of reading comprehension as "task-oriented reading" (Vidal-Abarca, Salmerón, and Mañá 2011, Salmerón et al. 2015).

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### *1.1 Background*

The ability to understand written text has been explored in previous years by offline experimental methods, which include the analysis of students' answers to different types of reading comprehension questions, as well as with introspection methodologies, such as "think-aloud protocols". Previous studies have investigated the effect of different strategic decisions that students employ in task-oriented reading, such as reading the question prior to the text or vice versa. These studies show that reading the questions prior to the main text provides readers with cues of relevance, allowing them to identify and pay closer attention to information of the text particularly relevant to the question (McCrudden, Schraw, and Kamble 2005). On the other hand, initial reading of the text allows students to construct a complete mental representation of the information that the text contains. This provides a source of basic information, which can be used to answer a number of questions without reviewing the text and guides students' review of the text more effectively, when needed (Rouet 2006, Cerdán et al. 2009, Vidal-Abarca, Mañá, and Gil 2010, Salmerón et al. 2015). In addition, it has been found that initial reading improves overall performance in task-oriented reading activities and is associated with high comprehension skills (Cerdán et al. 2009, Salmerón et al. 2015). However, studies also indicate that good performance is associated with choosing the most efficient strategy according to the task. For example, a question requiring inferencing or global understanding of a text is more favoured by initial reading, as opposed to a question requiring the identification of specific information (Cataldo and Oakhill 2000, Vidal-Abarca, Mañá, and Gil 2010).

In recent years, the study of reading comprehension has been enhanced with the possibilities offered by eye tracking systems, which provide data of readers' eye movements as they process a text real-time. Research has established, on the basis of empirical evidence, the assumption that cognitive processing of information is reflected on eye movement indicators during the performance of various activities (eye-mind hypothesis, Just and Carpenter 1980). Thus, the number and duration of fixations on an Area of Interest (AOI) are associated with depth of cognitive processing and spatial distribution of attention (Rayner 1998). The number and duration of visits at an AOI reflect the importance of this particular AOI and the informativeness of its content (Jacob and Karn 2003), while transitions from one AOI to another reflect the process of integrating information contained in different AOIs (Johnson and Mayer 2012). Especially in the context of performing reading comprehension tasks, information on where students focus, for how long and how many times they visit different AOIs of the text can be combined with their performance scores, allowing the investigation of their decisions and strategies when searching for information in a text in order to answer a question, but also of how effective these decisions and strategies were.

Eye tracking methodology has been applied in the study of reading comprehension in different research fields. Studies in the field of experimental research in language testing have been using eye tracking technology to investigate the cognitive processes activated by second language learners when performing reading comprehension tasks as part of EFL certification tests and thus to validate test tasks and items (Bax 2013, Brunfaut and McCray 2015, Brunfaut 2016). These studies show that eye tracking metrics related to task processing, i.e. interactions between the text passage and the questions, are able to highlight to some extend

differences between successful and unsuccessful readers and proficient and non proficient test takers in terms of reading strategies and cognitive processes employed. Overall, the studies indicate that higher proficiency level, as well as successful performance, is associated with more efficient location of relevant information in the text, less effortful reading and more focused reading of relevant information (Bax 2013, Brunfaut and McCray 2015). In terms of eye tracking metrics, less rigorous and more focused reading is reflected on less and shorter fixations on reading tasks' texts and responses, fewer and shorter visits and less switches between the text and the answers.

Eye tracking technology has also been used in educational research, combining methodologies from the field of language and academic skills assessment. A study which is particularly relevant to the present one is that of Solheim and Upstadd (2011), who investigated Norwegian students' reading strategies when performing a reading comprehension task involving a multimodal science text. This study aimed to explore the differences between successful and unsuccessful readers regarding the allocation of their visual attention to the text passage and the images. Their study classified students into four different problem-solving behaviours, as reflected in their eye movement patterns: (a) first-time readers, (b) non-strategic readers, (c) task-oriented readers and (d) effortful readers (Solheim and Upstadd 2011: 163).

### *1.2 Objectives and research questions*

The present study employs eye tracking methodology to explore the strategies of Greek secondary school students in the context of task-oriented reading. More specifically, it seeks to investigate the characteristics of reading behaviour that are associated with successful and unsuccessful reading comprehension, as reflected on students' eye movement patterns while interacting with the text passage and the comprehension questions. In this context, the main research question is:

What are the differences between successful and unsuccessful readers in task-oriented reading activities in terms of their reading behaviour, as reflected on their visual behaviour?

This research question is analysed into two secondary questions:

a) Which reading strategies are successful and which are unsuccessful?
b) What are the differences between successful and unsuccessful strategies in terms of eye-tracking measures?

The aim of this small scale experimental study is to investigate the usefulness of eye tracking methodology in identifying empirical indicators of reading comprehension, which can be used as features for the computational modelling of students' successful and unsuccessful behaviour. Models of students' reading behaviour can be further used for the purpose of the automated assessment of their reading skills and for their personalised support in reading comprehension tasks performed in technology-enhanced learning environments.

## 2 Method

### *2.1 Data collection procedure: Participants, materials and equipment*

Twenty-one second and third grade students of secondary schools of Athens, fifteen female and six male, with normal or corrected vision participated in the experimental procedure. Each student's final grade in the Greek language subject at school was recorded, as an indication of her/his language skills level.

The experimental procedure included three texts, two of which were part of previous reading literacy tests of PISA and one was part of the Reading Test-A (Panteliadou and Antoniou 2009). The texts belonged to three different genres: a) an argumentative text, presenting two opposing opinions on "Telecommuting", b) a directional text (Supermarket notice: "Peanut Allergy Alert-Lemon Cream Biscuits") and c) an informational text on "Maya civilization". Each text was accompanied by two or three multiple-choice questions, representing different reading goals: a) global reading of the text passage for comprehending main idea(s) and pragmatic function of phrases in the specific context and b) local reading for understanding the meaning of words, phrases or sentences.

Eye tracker Tobii TX-300 with 300 Hz sampling rate was used for the recording of eye movements and the Tobii Pro Studio software was used for the experimental set up, data collection, processing and analysis.

### *2.2 Data organisation and processing*

After the data collection procedure was completed, reading comprehension scores, i.e. correct and wrong responses on text questions, were automatically extracted per participant, text and question. In order to explore how comprehension scores were related to the students' actual reading behaviour, all video recordings of eye movements were observed for each participant, text and question and patterns of reading behaviour were encoded in two conditions, which corresponded to two main variables of analysis: a) reading the text passage for the first time: it was encoded whether or not students performed a complete initial reading of the text passage, before reading the question; b) reading the relevant text passage for answering a question**:** it was encoded whether or not they re-read the part of the text related to each specific question before submitting their answer.

Video recordings of eye movements where edited using the procedures of video segmentation and scene creation. Consequently, AOIs were defined on each scene, in order to export and analyse eye tracking data from particular areas of the text passage and the comprehension questions. The AOIs defined for each text were: a) the main text and its title, b) the whole question area (question and response options), c) the area of the question only, d) the area of the response options only, e) the part of the main text related to the specific question.

## 3 Data analysis - Results

Questions with high success rate (above 75%) were excluded from the analysis. The analysis included five questions, presented in Table 1:

| Question \| Text | Question characteristics – reading goals |
|---|---|
| Question 1 \| TELECOMMUTING: What is the relationship between the paragraphs "The way of the future" and "Disaster in the making"? | Requires careful reading and global understanding of the text, as well as understanding of the opposing main ideas. It can be answered with a careful first reading only. |
| Question 3 \| TELECOMMUTING: What does the phrase "grandiose idea" in the second text mean? | Requires understanding of the meaning of the word. It can be answered correctly without reading the text at all, given that the student already knows the meaning of the word. Otherwise, the meaning can be inferred after careful reading at the local level. |
| Question 3 \| SUPERMARKET NOTICE: Why does the notice include "Best before" dates? | Requires global understanding of the text, to identify the pragmatic purpose of a specified part of the text ("best before" dates) in the specific context. It can be answered with a careful first reading only. |
| Question 1 \| MAYA: How do you conclude that Maya knew good mathematics and astronomy? | Requires careful reading at the local level to make an inference on the basis of information contained in multiple sentences. It is difficult to be answered without re-reading the text, since the relevant information is difficult to be retained from first reading. |
| Question 2 \| MAYA: What does not fit the text? | Requires careful reading to retain the main information of the text and filter out the irrelevant information. |

**Table 1 | Comprehension questions and their characteristics**

### *3.1 Relationship between performance and reading strategies*

Analysis was based on each comprehension question separately. The participants where categorized into two groups of reading performance, successful and unsuccessful, on the basis of their score on each specific item. Moreover, they were grouped on the basis of their reading behaviour during the task, regarding the initial reading of the text and reading for answering each question: This analysis revealed the following patterns of successful and unsuccessful reading, as shown in Table 2:

| | Step 1: First reading of source text | Step 2: Reading of the question and choices | Step 3: Reading the AOI of the text related to the question | Step 4: Selecting the correct answer |
|---|---|---|---|---|
| **First-time reading** | ✓ | ✓ | | ✓ |
| **Non-strategic reading** | ✓ | ✓ | | |
| **Strategic reading** | ✓ | ✓ | ✓ | ✓ |
| **Effortful reading** | ✓ | ✓ | ✓ | |

**Table 2 | Patterns of successful and unsuccessful reading behaviour**

Successful reading exhibited two different patterns, first-time reading and strategic or careful reading. First-time readers were the students who read the text passage before reading the question, subsequently they read the question and response options and they selected the correct answer without revisiting the text to locate and read the relevant information in the corresponding AOI. Strategic or careful readers were the ones who read the text passage, they subsequently read the question and response options, then they located and read the relevant AOI in the text and selected the correct answer.

Unsuccessful reading exhibited two different patterns, similar to the successful ones but leading to the selection of the wrong answer. Non-strategic readers were the students who followed the same steps as their successful counterparts, first-time readers; they read the text passage and the question, they did not revisit the text to search for relevant information relevant to the question and they selected the wrong answer. Effortful readers followed all the necessary reading steps, which involved reading the text passage, the question and the relevant AOI, similarly to their successful counterparts, strategic readers, but they chose the wrong answer.

The reading behaviour patterns revealed from this analysis are similar to the classification of students into four problem-solving behaviours reported by Solheim and Upstadd (2011). The most frequent successful behaviour was strategic reading, representing 73,6 % of total correct responses, while the most frequent unsuccessful behaviour was effortful reading, representing 60,6% of total wrong responses, regardless of question type. It should also be noted that all students made a complete initial reading of the source text before submitting an answer.

### *3.2 Eye tracking analysis*

The next step of the analysis was to explore the differences between the four different reading strategies in terms of specific eye movement metrics. To this end, a number of eye tracking measures were calculated for each AOI (Table 3), including text processing metrics, which are relevant to the first reading of the text passage, as well as task processing metrics, which are relevant to the interaction between the text and the questions.

| Eye tracking metrics | Description |
|---|---|
| Fixation Duration (seconds) | Mean duration of each individual fixation within an AOI |
| Total Fixation Duration (seconds) | Sum of the duration for all fixations within an AOI |
| Fixation Count (N) | The number of times the participant fixates on an AOI |
| Visit Duration (seconds) | Mean duration of each individual visit within an AOI |
| Total Visit Duration (seconds) | The duration of all visits within an AOI |
| Visit Count (N) | The number of visits within an AOI |
| Time spent on an AOI (msecs) | The amount of time participants have spent on an AOI |
| Proportion of time spent on an AOI (%) | Total fixation duration on an AOI divided by total fixation duration on another AOI (e.g. tot. fixation duration on response options divided by the tot. fixation duration on the relevant AOI in the source text and the response options). |
| Fixations per second (N) | Total number of fixations within an AOI divided by total visit duration within the same AOI |

**Table 3 | Eye tracking metrics of data analysis**

Pair-wise statistical comparisons were performed between the four reading groups with T tests assuming unequal variances. The following paragraphs present the most remarkable and significant findings of the eye tracking analysis per comprehension question.

Table 4 presents the results of the eye tracking data analysis of Question 1 from the Telecommuting text, which required careful reading for global understanding of the text and the opposing main ideas.

| Reading behavior | Measure | Total Fixation Duration | | | Fixation Count | | | Total Visit Duration | | | Visit Count | | | % time fixating on responses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AOI | Q1 | Q1 Text | Q1 A | Q1 | Q1 Text | Q1 A | Q1 | Q1 Text | Q1 A | Q1 | Q1 Text | Q1 A | |
| First-time reading (N=3) | Mean | 11,94 | 0,5 | 8,74 | 59,33 | 3 | 42,33 | 14,18 | 0,57 | 10,44 | 5 | 0,67 | 3,33 | 0,96 |
| | Stdev | 3,90 | 0,86 | 3,27 | 17,79 | 5,20 | 15,04 | 4,80 | 0,99 | 4,06 | 1 | 1,15 | 1,53 | 0,070 |
| Non-strategic reading (N=2) | Mean | 17,01 | 0,73 | 14,01 | 76,5 | 4 | 59,5 | 21,14 | 0,83 | 17,48 | 6 | 1 | 5,5 | 0,95 |
| | Stdev | 1,98 | 1,03 | 2,58 | 4,95 | 5,66 | 2,12 | 0,60 | 1,17 | 0,40 | 2,83 | 1,41 | 4,95 | 0,075 |
| Strategic reading (N=8) | Mean | 19,64 | 43,22 | 16,78 | 88,4 | 194,89 | 72,9 | 23,97 | 52,36 | 20,36 | 10,8 | 8,56 | 10,4 | 0,34 |
| | Stdev | 13,19 | 55,57 | 12,96 | 63,16 | 227,75 | 56,90 | 17,26 | 64,77 | 15,91 | 9,38 | 9,59 | 8,87 | 0,151 |
| Effortful reading (N=4) | Mean | 24,22 | 10,04 | 17,88 | 96 | 45,25 | 65,5 | 27,65 | 11,58 | 20,23 | 8 | 3,5 | 8,5 | 0,66 |
| | Stdev | 7,90 | 6,41 | 6,84 | 31,80 | 33,60 | 24,96 | 8,84 | 7,67 | 7,78 | 3,27 | 1,73 | 4,51 | 0,11 |

**Table 4 | Eye tracking analysis of Q1 (Telecommuting)**

At first, it should be noted that the reading strategies revealed by observing the participants' gaze recordings were confirmed by the eye tracking data analysis; first-time and non-strategic readers almost never visited or fixated on the AOI of the text in order to answer the question, compared to strategic and effortful readers, a finding which was significant in all metrics. No significant differences were found between any group regarding the initial reading of the main text.

Some observed but statistically weak differences ($p<0.1$ level) were found between strategic and effortful readers, whose common characteristic was that they both answered the question after revisiting the text. Strategic readers, compared to effortful readers: a) made more and longer fixations in the text which was relevant to the question (tot. fixation duration p=0,095, one tailed p= 0.04, fixation count p= 0,068, one tailed p= 0.03), b) made more and longer visits in the same AOI (tot. visit duration p= 0,082, one-tailed p= 0.04, visit count one-tailed p= 0.06). The results point to the fact that strategic readers process the relevant text AOI more carefully than effortful readers. Effortful readers spent more time fixating on the response options rather than the text where the answer is to be found, compared to strategic readers (p= 0.002).

Analysis of reading time didn't reveal any statistically significant results. However, for Q3 of the Supermarket notice text, analysis of reading time indicated that successful readers in general spent more time in the initial reading of the main text than on reading during question answering (one-tailed p= 0,044, two-tailed= 0,089). Further analyzing the group of successful readers, it was found that first-time readers, who didn't revisit the text to answer a question, spent more time on the initial reading of the text than all the other groups ($p< 0,05$ for all pairs). Table 5 presents the results of the eye tracking analysis for Q3:

| Reading behavior | Measure | Total fixation duration | | Fixation count | | Total visit duration | | Visit count | | % of time fixating on responses |
|---|---|---|---|---|---|---|---|---|---|---|
| | AOI | Q3 A | Q3 Text | Q3 A | Q3 Text | Q3 A | Q3 Text | Q3 A | Q3 Text | |
| first-time | Mean | 5,29 | 0 | 23,75 | 0 | 6,73 | 0 | 1,75 | 0 | 1 |
| | Stdev | 2,54 | 0 | 9,18 | 0 | 1,99 | 0 | 1,5 | 0 | 0 |
| non-strategic | Mean | 14,35 | 0,0425 | 54,5 | 0,25 | 15,83 | 0,0425 | 3,75 | 0,25 | 1,00 |
| | Stdev | 6,26 | 0,09 | 22,93 | 0,5 | 6,71 | 0,09 | 2,22 | 0,5 | 0,01 |
| strategic | Mean | 18,26 | 7,83 | 79,50 | 37,33 | 20,88 | 8,88 | 5,67 | 4,33 | 0,73 |
| | Stdev | 8,27 | 7,47 | 36,27 | 33,79 | 9,44 | 8,40 | 2,34 | 1,97 | 0,19 |
| effortful | Mean | 15,96 | 6,97 | 74,83 | 34,17 | 19,35 | 8,58 | 7,33 | 4,00 | 0,74 |
| | Stdev | 6,45 | 5,43 | 22,60 | 24,45 | 5,52 | 6,81 | 4,32 | 2,83 | 0,12 |

**Table 5 | Eye tracking data analysis of Q3 (Supermarket notice)**

The analysis discriminated the group of first-time readers from all the other groups in all task processing metrics. In sum, first-time readers: a) fixated less (count and duration) in the question and responses area; b) made less and shorter visits to the question and response options ($p< 0,05$ in all metrics). No significant differences were

found between the other groups. Combined with findings on total reading time, the results indicate that first-time readers "invested" on the initial reading of the text, so they had to put less effort in reviewing the text or switching between text and questions to find the correct answer. This strategy proved beneficial for this type of question, which required global reading for understanding the pragmatic function of a specific phrase in the specific context.

Regarding the last question analyzed, Q1 from the Maya civilization text, analysis of reading time indicated that first-time readers spent less time on reading the question and response options than their unsuccessful counterparts, non-strategic readers (p= 0,008). Moreover, first-time readers spent more time on the initial reading of the text than non-strategic (p= 0,009), strategic (p= 0,001) and effortful readers (two-tailed p= 0,073, one-tailed p= 0,036). Table 6 presents the results of the eye tracking data analysis of Q1:

| Reading behavior | | Total Fixation duration (sec) | | Fixation Count (N) | | Total Visit Duration (sec) | | Visit Count (N) | | Fixations/sec (N) | | Proportion of time fixating on responses (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Q1 A | Text first reading | Q1 A | Text first reading | Q1 A | Text first reading | Q1 A | Text first reading | Q1 A | Text first reading | |
| First-time (N=4) | Mean | 5,62 | 35,16 | 26 | 165,5 | 6,4375 | 42,41 | 1,75 | 2,5 | 4,20 | 3,93 | 1,00 |
| | Stdev | 1,67 | 11,10 | 7,53 | 50,93 | 1,95 | 13,23 | 0,50 | 1,73 | 0,23 | 0,23 | 0 |
| Non-strategic (N=4) | Mean | 7,48 | 47,19 | 28,75 | 164,33 | 8,945 | 52,73 | 3,5 | 2 | 3,19 | 3,07 | 0,99 |
| | Stdev | 2,63 | 9,73 | 9,18 | 57,27 | 2,41 | 12,08 | 3,79 | 1,00 | 0,52 | 0,40 | 0,02 |
| Strategic (N=10) | Mean | 8,36 | 35,00 | 37,33 | 149,78 | 9,41 | 42,02 | 4,56 | 3,22 | 3,98 | 3,60 | 0,49 |
| | Stdev | 2,38 | 6,15 | 12,31 | 22,13 | 2,68 | 6,57 | 2,13 | 1,39 | 0,34 | 0,28 | 0,11 |
| Effortful (N=2) | Mean | 14,66 | 60,98 | 76 | 276,5 | 18,6 | 74,22 | 8,5 | 6,5 | 4,15 | 3,71 | 0,64 |
| | Stdev | 4,48 | 30,78 | 21,21 | 160,51 | 6,77 | 42,01 | 3,54 | 6,36 | 0,29 | 0,06 | 0,21 |

**Table 6 | Eye tracking data analysis of Q1 (Maya civilisation)**

The analysis revealed that first-time readers, apart from spending more time on the initial text reading, made more fixations/sec on it compared to non-strategic and strategic readers (p= 0,045 and p= 0,038, respectively), which indicates more careful reading. Moreover, they made more fixations/sec on the responses area, which indicates more careful reading of the options than their unsuccessful counterparts (p= 0,023). Effortful readers' data in all metrics differed from their successful counterparts, strategic readers, pointing to more effortful cognitive processing of the text and the response options: more fixations/sec on first reading, longer fixation duration, more fixations, more and longer visits in question and responses area. However, these observed differences were not statistically confirmed due to the small number of cases (n=2) of this group.

## 4 Conclusions

The study provided evidence that eye tracking methodology can reveal different patterns of reading behavior in the context of task-oriented reading. The findings showed that students' successful performance relied more frequently on careful initial reading of the source text, before reading and answering the questions. First reading of the text seems to effectively guide students to the selection of the correct answer, even without revisiting the text, at least in case of questions which required reading at the global level. Moreover, it was shown that focused, careful and cognitively intensive re-reading of specific parts of the text passage, where information relevant to the question was located, was another successful reading pattern.

On the other hand, unsuccessful performance was about either not employing the right strategy for a specific question, for example not revisiting the text to locate the

information required to answer the question, or not putting the required effort, in terms of time and attention, to process the information needed.

The eye tracking metrics applied in the present study, i.e. fixation and visit metrics on the text passage, questions and relevant text AOIs, provided some reliable evidence on the characteristics of the different reading behaviors observed. However, evidence was not always statistically strong, due to the small number of participants in each group, and, thus, not able to be generalized. It should also be noted that the relationship between eye tracking measures and performance in the context of task-oriented reading is not straightforward, but it should be interpreted in relation to the characteristics and requirements of each particular question. The same metric, for example many or long fixations or visits into an AOI, can sometimes be an indication of effortful but ineffective cognitive processing of textual content in a question which requires global understanding of the text, and sometimes an indication of focused and effective reading in a question which requires local reading for specific information.

A more general conclusion that could be drawn is that modeling students' reading behavior in the context of task-oriented reading can be based on text processing metrics, as they are particularly important indicators of the quality of initial reading of the text and are associated with successful performance. It is worth exploring and exploiting other metrics as well, such as saccade and regression metrics. However, a comprehensive modeling of reading behavior should also be based on task processing metrics related to interactions between the text passage and the questions, which are task-specific and are able to highlight specific reading strategies in relation to specific question types.

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