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ENGLISH LANGUAGE FLUENCY
AND THE WAY POLISH SCHOOL STUDENTS WORK
WITH ENGLISH TEXTBOOK MATERIAL
ON THE EXAMPLE OF TWO STUDENTS

ABSTRACT

Eye tracker makes it possible to see where and how the person is looking. During the analysis of previously collected eye-tracking data my attention was drawn to two school students whose English language communicative skills were on different levels and that is why I assumed they should work with the English textbook material in a different way.

The aim of the article is to show not noticed at the first sight differences in their way of working with the English textbook material.

KEYWORDS: fixation, saccade, eye movements, student, textbook

STRESZCZENIE

Dzięki zastosowaniu okulografu w badaniach glottodydaktycznych możliwe jest śledzenie ruchu gałek ocznych. W trakcie analizy danych z badań okulograficznych zwróciłam uwagę na dwie uczennice, które ze względu na różny poziom sprawności komunikacyjnej w języku angielskim powinny pracować z materiałem podręcznikowym w odmienny sposób.

Celem artykułu jest pokazanie teoretycznie niewidocznych różnic w sposobie pracy z materiałem podręcznikowym tych dwóch uczennic.

SŁOWA KLUCZOWE: fiksacja, sakada, ruchy gałki ocznej, uczeń, podręcznik

INTRODUCTION

Reading is one of the most common activities of all the people irrespective to their social and educational background. Reading is the subject of teaching from the very first grade of every primary school and is practiced throughout a few first years of school education. The ability to read is the basis of efficient and proper functioning of a person in society and that is why it so important to be a good and

fluent reader. Those who are missing this skill or are not fluent in it are suffering from many unnecessary problems.

Primary school students who learnt to read in Polish (I and II grade of primary school) are very soon confronted with reading in a foreign language, usually English. That is because from the first grade of primary school pupils are taught a foreign language (in most cases it is English). At the very beginning of learning English at school English language acquisition is based on listening activities and recognising the meaning of words but without writing them (at the same time pupils only learn to read and write in Polish). Writing and reading in English is introduced later.

Learning English in Poland is based on the English textbook that is the main and still the most important tool for many teachers and students. There are many different textbooks of English used in Polish schools and the way they stimulate the process of language acquisition is the subject of my scientific interest. Because of that the aim of the following article is to analyse two exemplary ways of working with the English textbook material by secondary school students. The data that is the subject of the analysis was collected in the eye-tracking research conducted on a group of secondary-school students. Two students whose results will be compared are of the same age but of different English language level.

STUDIES ON READING IN BRIEF

Human eyes have been the subject of (scientific) interest for hundreds of years and the very first written information about eye movements dates back to the end of 16th century (Soluch/ Tarnowski 2013). The end of 19th century was the time of the growing interest in the way the eyes work as well as in the eye movements. That was also the moment that the first attempts to record eye movements were made. The first eye-tracking study related to eye movements while reading is believed to have been conducted by the French ophthalmologist Louis E. Javal. He is said to have been the first one not only to conduct the eye-tracking research but also to introduce the name "saccade" for one type of eye movements. However, some of the contemporary researchers (Wade/ Tatler 2009) claim that it was not Javal but his colleague M. Lamare who conducted the research instead of Javal. At the same time a very similar research was completed by Ewald Hering who was not related to Javal or Lamare at all. It should be emphasized, though, that Javal never claimed that it was him who conducted the eye-tracking research. Instead, he was naming Lamare as the author of the research whose consequence was the observation that eye movements during reading are not linear as it had been thought (see Javal 1905). Not only did they come to that conclusion but also E. Hering did (the one who was conducting a similar research at the same time). At that time the scientific interest was aimed not only at mechanics of eye

movements while reading but also at different ways of reading (i.e. different ways of moving one's eyes) depending on reading skills, age of the reader or reading in specific situations (when learning orthography, learning to read in a foreign language etc.) (Tinker 1980).

Regardless of all the doubts connected with the real father of eye-tracking research during reading, the end of 19th century was an important breakthrough in that field and started the era of scientific interest in this activity of human being. As a consequence, for the next hundred years or so a lot of work was done to design and make the device used to measure eye movements better and better. The aim was to build the eye-tracking device that would record the movements of the eyes in the most non-invasive way. It seems that nowadays this goal has been reached.

One of the most influential scientists in the field of eye-tracking research on reading was Keith Rayner. In 1998 he published one of his most important work "Eye Movements in Reading and Information Processing: 20 Years of Research". It is probably the broadest review of the state-of-the-art in the field of that time. Before this paper was released K. Rayner and his colleagues had conducted a lot of eye-tracking research and he had published (1978) his paper "Eye Movements in Reading and Information Processing". The paper of 1998 revised not only his research results but also the results of other scientists. In both papers K. Rayner concentrated on the process of reading in relation to normal readers as well as to such groups as speed readers, those experiencing reading difficulty (poor readers), dyslectic readers, stenographers etc.

Nowadays, i.e. 20 years after the paper was published, the research on reading is still conducted. The most important aspects of it are those related to the ways of reading, reading by people suffering from reading difficulty (mainly children), dyslectic children etc.

However, in the following paper the attention will be concentrated not only on reading but also on looking at pictures and other graphic elements. It was K. Rayner and his colleagues who in 2001 expressed their surprise because of the lack of eye-tracking studies that addressed the characteristics of eye movements when texts and pictures are combined: "Although a considerable amount of research has addressed the characteristics of eye movements when either reading or looking at pictures (…), it is somewhat surprising that so little research has addressed the characteristics of eye movements when text and pictures have to be integrated in the comprehension process" (Rayner et al. 2001: 219). The lack of that type of research was surprising taking into consideration the fact that the majority of what people read consists of both pictorial and diagrammatic information (Duffy 1992).

The fact is that nowadays one of the very first contacts with both visual language and pictures is in children books, then during the first reading experiences at school and it continues in teenage and adult experience with Internet, smartphones, magazines and newspapers.

Because of that it is worth having a closer look at the English textbook that combines both textual and visual information and is a teaching-and-learning tool that the majority of us is familiar with. It is especially interesting to compare two secondary school students and their way of working with the exemplary textbook pages (material) from the point of view of the difference in their English language skills. The skills and the knowledge of English are different and it can be assumed that because of this their eye movements while working with the same textbook material are different.

The research question that should be asked is: does (and in what way) the level of English language fluency influence the way students work with the textbook material? The answer to the question can be given with the help of eye tracker.

EXPERIMENT

In April 2015 I conducted the second eye-tracking study aimed at analyzing the participants' (i.e. secondary school students) eye movements during the process of working with the given part of the work- and textbook of English. It needs to be said that eye-tracking allows to observe and analyse the way the person looks at the object(s), so it may be possible to see in details what is at the central direction of gaze as well as to follow along the path of the visual attention of the observer (Duchowski 2007: 3). Eye trackers are advanced physiological systems of measurements (Holmqvist et al. 2011: 11), they send the processed images to computers with which they are integrated, and the software analyses the data to present the results in an effective way (http://www.neurodevice.pl/en/services/eye-tracking, 21.10.2015).

The detailed description of the method, participants, data acquisition etc. was given in my previous papers (for example Andrychowicz-Trojanowska 2016b), and that is why I will give here only the most important and relevant information about the participants, materials and the way the research was conducted.

PARTICIPANTS

The total number of the students whose recorded results were analysed was 21 (8 dyslectic and 13 non-dyslectic). The place of the experiment was the school. The students' fluency in English was on the pre-intermediate, intermediate and upper-intermediate levels and they were the students of the I, II and III class (grade) of the secondary school.

During the analysis of the collected eye-tracking data (aimed at the ways dyslectic and non-dyslectic secondary school students work with the textbook of

English) some extra observations occurred and some new, not planned before, questions arose. One of them was the question related to the difference in the way students work with the textbook and workbook material depending on their fluency in English. To observe the problem I chose 2 participants (out of 21 mentioned above) not suffering from dyslexia and similar to each other from the point of view of age, sex (although sex was not an important factor in the study), length of the English language learning etc.

MATERIAL AND DATA ACQUISITION

The materials the students worked with were showed on the computer screen and consisted of the black-and-white material being an example of the workbook (reading part) and the colourful one (reading part), being an example of the textbook. There was also a questionnaire in the paper form that was given after completing the tasks (a participant had a chance to write there down his/her opinions that could be helpful when analysing the research results). Both materials presented to the students are shown in Figure 1 and 2, together with areas of interest (AOI) related to each of them (see more about AOI below).
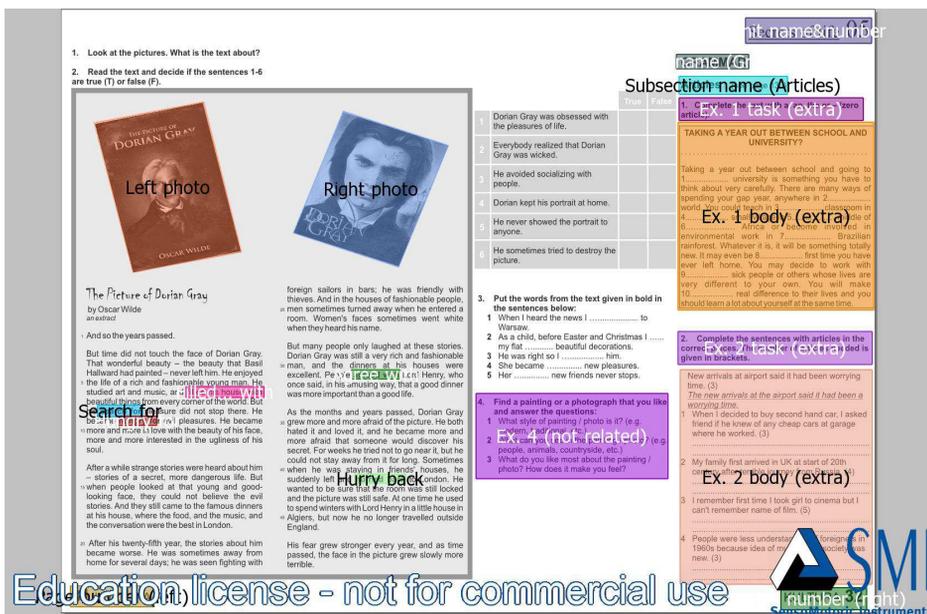
Figure 1. Black-and-white material and some of the AOIs.[1]

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[1] All the figures and tables were made by the author.

Figure 2. Colourful material and some of the AOIs.

It should be emphasized that the texts in both materials were not the same, however, they were of similar length and level of difficulty (intermediate). The type of exercises the students were asked to complete were the same in both of them.

The participants' eye movements were recorded with SMI RED 500 eye-tracking system with the sampling rate of 250 Hz. The participants sat in front of a 22-inch LCD monitor (equipped with the mini video camera (an eye tracker) placed just under it) at a distance of about 60 cm. The average tracking ratio (i.e. the proportion of time the eye tracker recorded point of gaze coordinates over the entire task – Amso et al. 2014: 2) was 96.3% for the whole experiment with standard deviation of 1.64%. The recorded data was analysed with the help of BeGaze 3.5 analysis software.

When calibration was completed, on the computer monitor the black-and-white material (Figure 1) was displayed and the student heard the task to complete exercise 2 on page 31. When it was done, the second task (to complete exercise 3 p. 32) was given. When the tasks in the black-and-white material were completed (there was no time limit) the student could see the colourful material on the monitor and heard the first task to complete exercise 2 on page 11 and when it was done – the second one (to complete exercise 3 p. 12 – see Figure 2; there was no time limit, too). At the end of the experiment the participants were asked to fill in the questionnaire related to the experiment.

RESULTS

To begin with, it is necessary to shortly characterize 2 participants whose eye-tracking data will be analysed further. Their characteristics is given in the table below.

Table 1. Basic information about 2 participants of the eye-tracking study

Student	Age	Sex	Dyslexia	Grade	CEFRL
1	16	F	No	1	A1
2	16	F	No	1	B1

Both participants were of the same sex (this parameter is of no importance in the study), were of the same grade and of the same age. That means that their history of learning English should be more or less the same from the point of view of its length and their language skills related to age. However, for some reasons the level of their English language fluency was different. Student 1 was on elementary level whereas student 2 – on intermediate level (A1 and B1, respectively, according to *The Common European Framework of Reference for Languages*, CEFRL).

Because of the fact that I was a teacher of Student 1 I knew her limitations and problems with acquiring language skills (it needs to be said that she was a generally weak student). On the basis of my observations and curiosity I wanted to check if at all her way of working with the textbook material is different. After conducting the eye-tracking study I extracted her data and compared it with the one of a much more fluent student of the same age.

To see the differences and similarities I will present below the following eye-tracking parameters: AOI sequence charts, fixation and saccade count, fixation duration average, total and maximum, saccade duration average, total and maximum, saccade average amplitude and velocity, and blink count.

AOI sequence charts

The given below charts are strictly related to the participant's activity on particular areas of interest (AOI). AOIs are the parts of the stimulus (i.e. material that is the subject of the eye-tracking research and is presented on the computer screen) the researcher is especially interested in and wants to get the eye-tracking data about (it is the researcher who defines AOIs; the participant does not see the AOIs on the stimulus). In both materials there were such AOIs named (see Figure 1 and Figure 2 above) and on the charts below one can see which of them were looked at by the participant and at what time and order. On the y-axis the AOIs names are given whereas on the x-axis the time (the moment) of working with the stimulus is shown. The colourful bars show the eye activity.
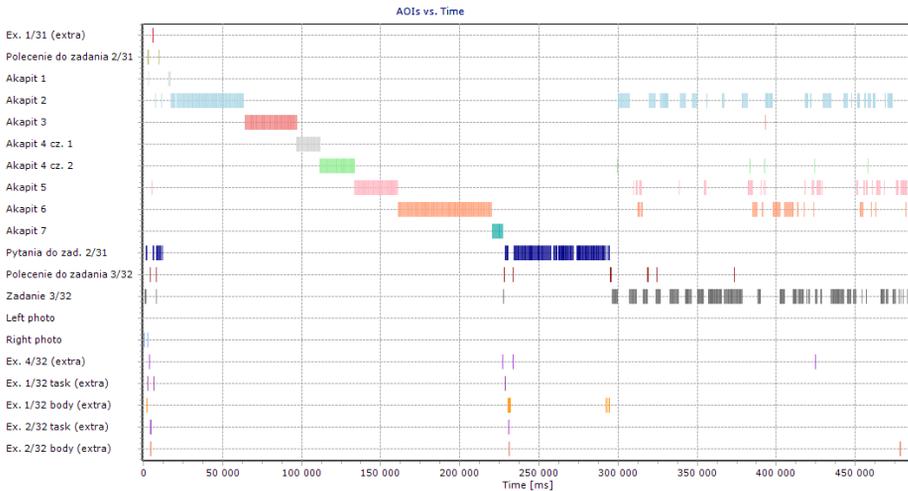
Figure 3. AOI sequence chart of Student 1, black-and-white material.
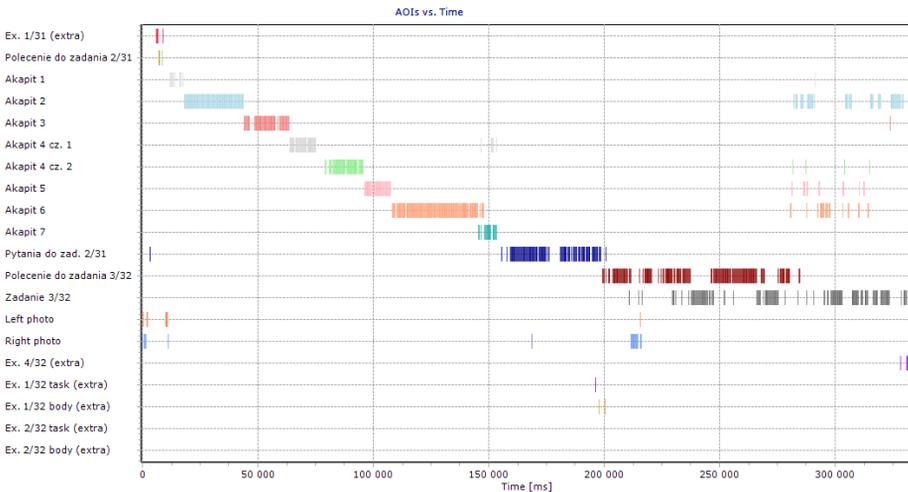
Figure 4. AOI sequence chart of Student 2, black-and-white material.

At the very first sight Figure 3 and Figure 4 (both related to the black-and-white material) seem to be similar. Both students started their eye contact with the black-and-white material with a short look at random AOIs and when the task was given they started completing it. Student 1 (Figure 3) glanced at the task to exercise 2 (i.e. the one out of two to be completed), then looked at the set of questions related to it and started reading the text paragraph by paragraph. While reading she did not look at any AOIs which means she was not disturbed by any

of them. When the text was read, Student 1 read the questions and while reading them she was giving the answers. It is worth noticing that she did not look back at the text while answering the questions but a few times she looked at the AOIs not related to the task. While completing the next task (exercise 3) she hardly looked at the task itself but paid a lot of her visual attention to the exercise and the text (she was looking for the correct answers in the text).

Student 2 acted in a similar, although she read the questions in exercise 1 only when she finished reading the text. When completing exercise 3 she paid much more visual attention to the task itself (it may mean she did not really understand it) as well as to the exercise itself.

The very first impression is that there are no significant differences between the students although their language communicative skills were different. However, the important difference between Student 1 and Student 2 is the time they needed to complete both tasks in black-and-white material. The time can be seen on x-axis – in the case of Student 1 it is almost 486 992 ms (8 minutes and 6 seconds) whereas in the case of Student 2 it is 333 407 ms (5 minutes and 33 seconds). So, Student 1 was working with the black-and-white material two minutes and a half longer and because of that, theoretically, had more chances to look at other AOIs (but she did not).

Figures 5 and 6 below show the eye activity of the same students on the colourful material. The charts show similar way of working with the materials which proves their non-accidental character.
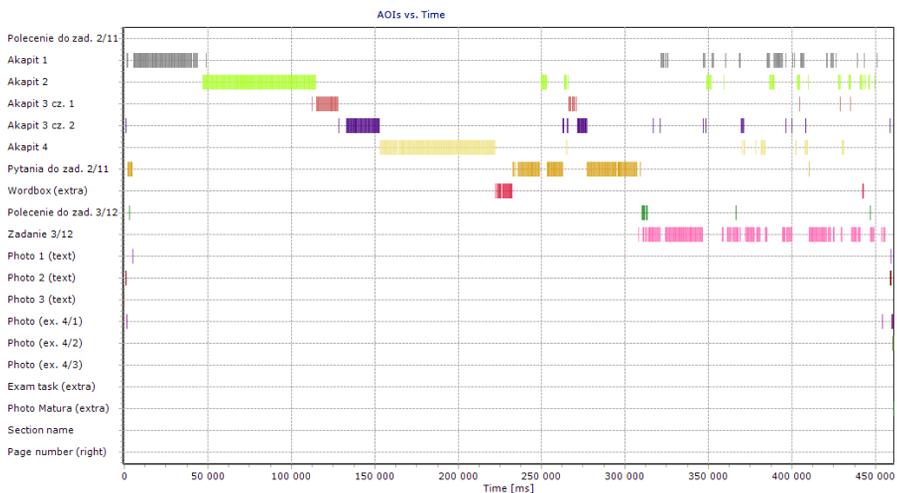
Figure 5. AOI sequence chart of Student 1, colourful material.
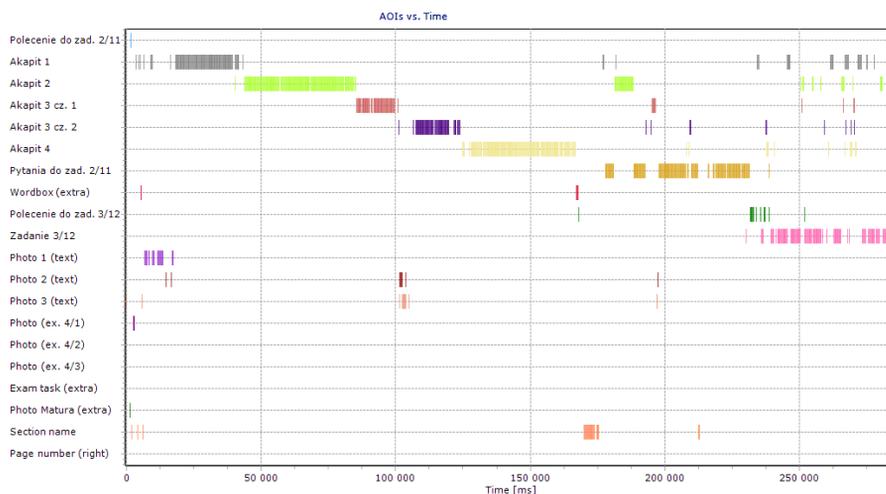
Figure 6. AOI sequence chart of Student 2, colourful material.

In the case of colourful material Student 1 needed 461 326 ms to complete the task (7 minutes and 41 seconds) whereas Student 2 needed 286 111 ms (4 minutes and 46 seconds) for the same, which is almost 3 minutes shorter, although the way of doing it seems to be similar at the very first sight. It can be noticed that Student 2 was more willing to look at other AOIs that were not directly related to the completed tasks (Photo 1, Photo 2, Photo 3 etc.) whereas Student 1 was more concentrated on the tasks although she had more chances to "look around" because of the longer time spent on it. This time Student 1 did not read the task to exercise 2 (the first out of two to be completed).

More differences will be revealed by the fixation- and saccade-related parameters.

Fixation-related parameters

A fixation is an event when the eye remains still over a period of time, usually from some tens of milliseconds up to several seconds (for example on a word during reading; fixation is considered to be a measure of visual attention to the particular position although exceptions to that exist) (Holmqvist et al. 2011: 21–22). Between fixations there are rapid eye movements called saccades.

It has been proved over the years of eye-tracking research that textual and typographical variables influence eye movements – the more conceptually difficult text, the longer fixation duration, and the shorter saccade length, as well as the higher frequency of regressions, i.e. right-to-left eye movements along the line or movements back to lines that has already been read (see more in Rayner 1998).

Although the material that was the subject of the study was both textual and visual one, still it is worth reminding some basic characteristics of reading the

text by good readers and poor readers as it can also be applied to the analysis of eye movements in textbook material – poor readers make longer fixations, shorter saccades, more fixations and more regressions than good readers (Rayner 1998). Student 1 in our study can be called both a poor reader and a weak student in general, whereas Student 2 is a good reader. If so, it can be assumed that there are some differences in the way they perceive the textbook material and complete the task (the assumption is based not only on the theoretical background but also on practice of teaching Student 1 that made me know her limitations in English). The above AOI sequence charts showed that there are no significant differences between these two particular students from the point of view of their way of completing the given tasks. However, the difference in time needed to complete the activity suggests that there might be some differences in their eye movements during the task that are strictly related to the time difference.

The first fixation-related parameter to be analysed is a fixation count, i.e. the number of fixations done by the eyes during the study.
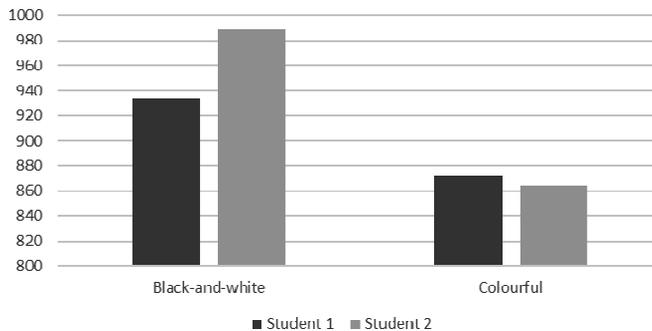
Figure 7. Fixation count for both materials and both students.

Figure 7 shows that the number of fixations by Student 2 (i.e. the one who is more fluent in English) in comparison to Student 1 was bigger in the case of black-and-white material and slightly smaller in the case of the colourful one. To be able to compare the data we should relate the number of fixations to the time of completing the task (Figure 8).

Figure 8 shows that during the whole time of completing the tasks it was Student 2, not Student 1, who fixated more often in both materials. If we, however, have a look at the average duration of the fixations (Figure 9), it will turn out that Student 1 in general fixated less often (Figure 8) but the duration of the fixations was longer.
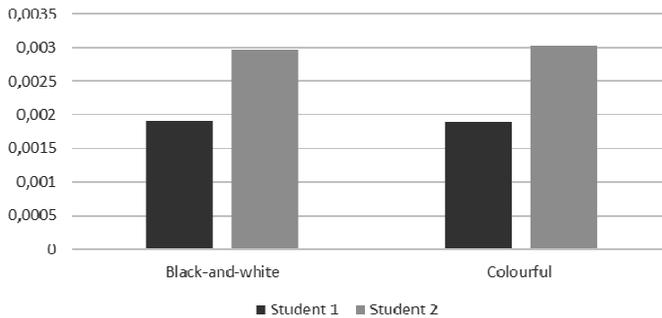
Figure 8. Fixation count in relation to time for both materials and both students.
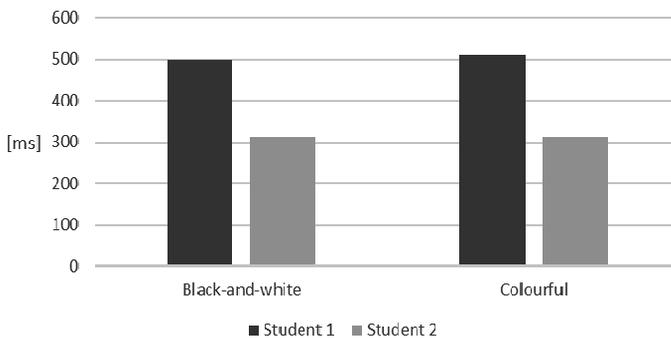
Figure 9. Fixation duration average [ms] for both materials and both students.

This information is of some importance because the duration of fixation is related to the cognitive load and information processing. It is believed that the longer fixation, the more time is spent on interpreting (Goldberg/ Kotval 1999) and that means the more complicated it was for a reader (Płużyczka 2015). It is also said that the longer fixation duration, the most problematic perception of the fixated object (Renshaw et al. 2004) as the length of this parameter indicates difficulty or easiness of extracting information (Just/ Carpenter 1976). In the case of Student 1 who was not fluent in English it seems to be truth that reading the text in English on the intermediate level (i.e. B1 level of language difficulty) was a problematic task (I was able to confirm that after the study when I could interview the student). The latter is mirrored in the maximum duration of fixation presented below.

Figure 10 shows that the maximum duration of fixation by Student 1 was as much as two times bigger in black-and-white material than the maximum one by Student 2. In the case of colourful material the difference was not that big although it was still bigger for Student 1. When comparing both materials regardless of students it should be emphasized that the maximum fixation duration was bigger for colourful material than for black-and-white one, especially in the case of Student 2

(the reasons of that are not in the scope of interest of this article but some hints will be given in the Discussion part).
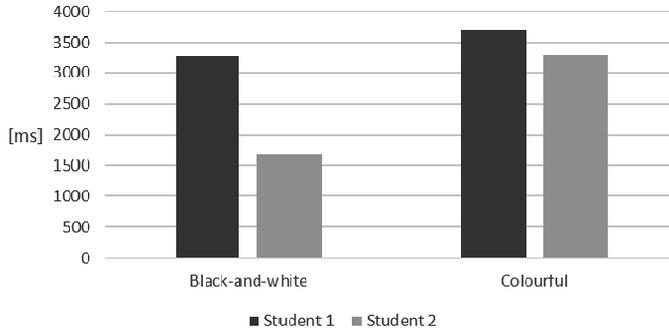
Figure 10. Fixation duration maximum [ms] for both materials and both students.

Saccade-related parameters

The second important group of parameters is related to saccades. Because, as it was said before, saccades are rapid and very fast eye movements occurring between fixations and lasting 30-80 milliseconds (Lorigo et al. 2008; Holmqvist et al. 2011), no new information is obtained during a saccade (Rayner 1998). More saccades are the indicator of more searching (Goldberg/ Kotval 1999). It is also said that the number of saccades is strictly related to the spatial organization of information in the stimuli, i.e. the poorer organization, the more saccades (Grobelny et al. 2006). Shorter saccades, however, are more typical for poor readers.

Figure 11 below presents the number of saccades that were registered by the eye tracker for both students.
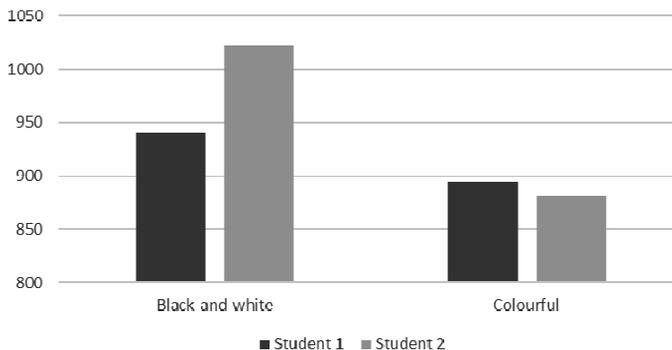
Figure 11. Saccade count for both materials and both students.

In black-and-white material Student 2 in general made more saccades than Student 1 whereas in colourful material it was Student 1 who made a bit more of them. It should be remembered that there was the difference between both students related to time needed to complete the tasks and the number of saccades should be divided by the time. However, because the number of saccades equals the number of fixations minus one (Francuz 2013), the bar chart showing it will be almost the same as Figure 8. It is also important to notice that the difference between the number of saccades of both students between both materials is noticeable. One of the possible reasons of that is the structure of both materials – black-and-white one structure was a bit more complicated because of some set of different excercises with the same numbers and because of the pictures related to the text and presenting men's faces (see more in Andrychowicz-Trojanowska 2016a).

The duration of the saccades (Figure 12) differs for both of the students although the differences are not of a big significance. The average duration of saccades of Student 1 is shorter for both materials, but the individual difference between the students is bigger in the case of black-and-white material. The maximum duration of saccade (Figure 13) is in both materials almost twice shorter for Student 1.
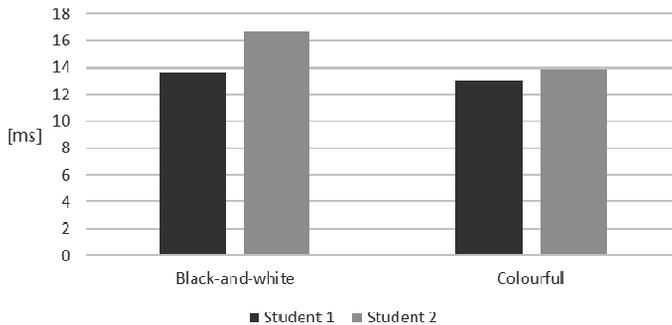

Figure 12. Saccade duration average [ms] for both materials and both students.
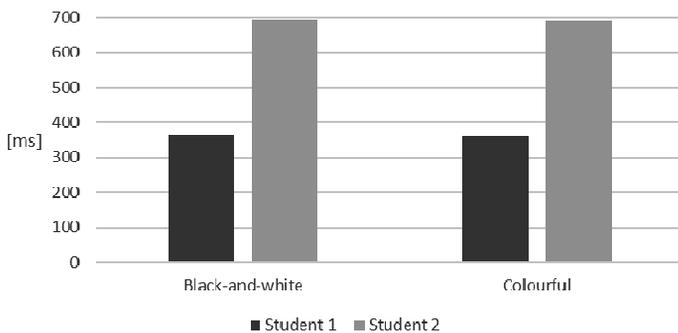
Figure 13. Saccade duration maximum [ms] for both materials and both students.

The above data related to saccades confirms what is known about good and poor readers. Student 2 who is fluent in English and good at reading English texts is believed not to make regressions but to make longer saccades. Student 1, because of the fact that is less fluent in English, reads slower in English (which was seen in the time needed for completing the task by her). As a consequence, to understand the text she stops on the words (i.e. fixates the words) twice more often that it is really needed. A slower reader makes more regressions to check and/or confirm the already read information. The above is seen in the Figures 12 and 13 above, showing longer saccades for Student 2.

It is also worth analysing the average saccade amplitude and average saccade velocity for both students and both materials. The data is presented in Figures 14 and 15 below.
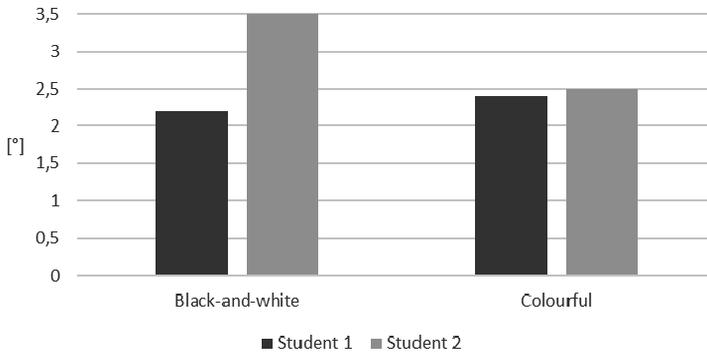
Figure 14. Saccade amplitude average [°] for both materials and both students.
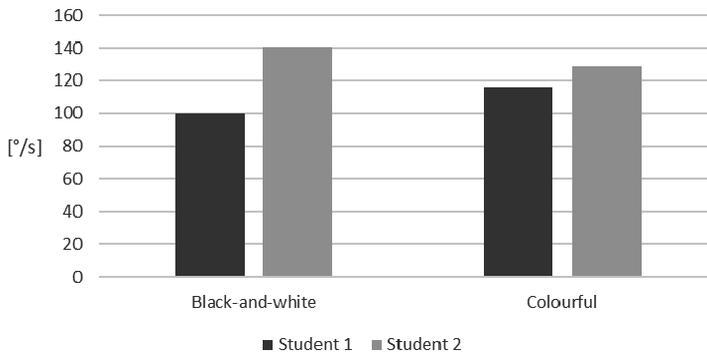
Figure 15. Saccade velocity average [°/s] for both materials and both students.

An amplitude of saccade is the length of saccade given in degrees. In other words, it is a distance from start point to end point of the saccade and it is calculated by multiplying saccade average velocity by its duration. Figure 14 shows that in

the black-and-white material Student's 2 average saccade amplitude was much
bigger that the one of Student 1. However, in colourful material the difference
between the students got definitely smaller not only because of the decrease in
Student's 2 parameter value, but also, interestingly enough, by the increase in the
value of Student 1 parameter. The change that occurred in the case of Student 2
may be the reason of the colour set of the colourful material that may have been
more effective in the case of Student 1. Average velocity of saccades (Figure 15)
shows that in both materials it was Student 2 who made faster saccades but it also
decreased in colourful material whereas the increase was registered for Student 1.

The last metrics that should be mentioned is the relation of total saccade and
fixation duration that is presented in Figure 16 together with separate data of
saccade duration total (Figure 17) and fixation duration total (Figure 18).
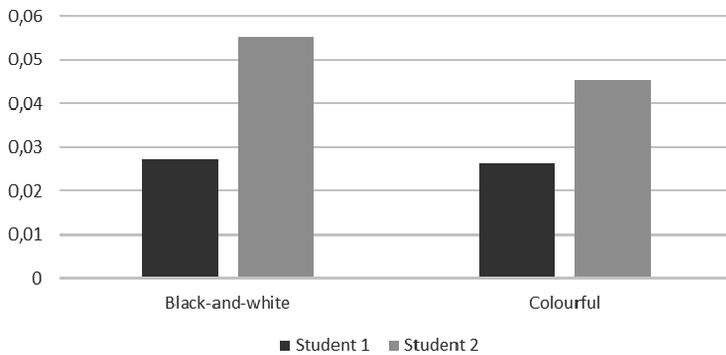
Figure 16. Relation of saccade duration total and fixation duration total for both materials
and both students.

The relation is almost the same for Student 1 in both materials and at the
same time it is almost twice smaller than for Student 2. However, in the case of
Student 2 it decreases in the colorful material.
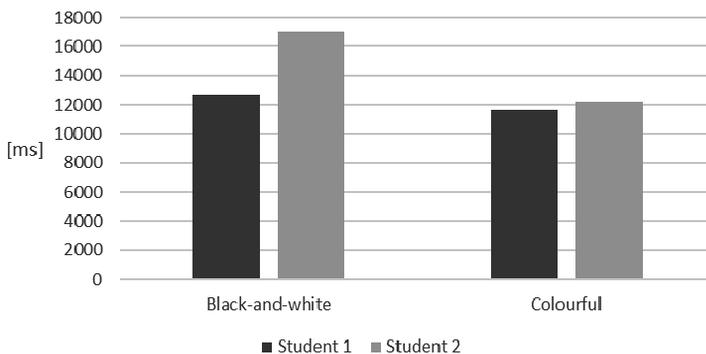
Figure 17. Saccade duration total [ms] for both materials and both students.
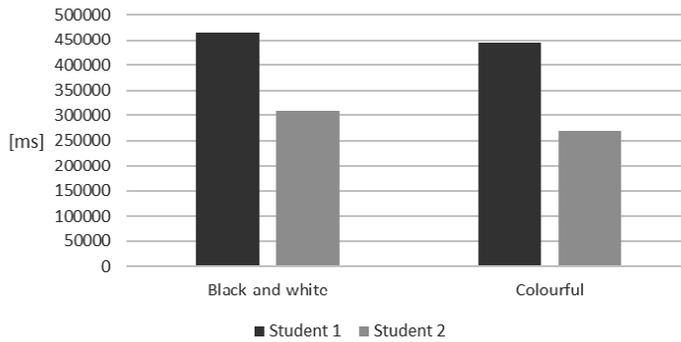
Figure 18. Fixation duration total [ms] for both materials and both students.

To conclude, it can be said that Student 1 who was a poor reader made longer fixations and shorter saccades of smaller velocity and amplitude and her way of working was more or less the same in both materials. Student 2 who was a good reader did the opposite but in her case the differences between the way she worked in black-and-white and colourful material are definitely more significant.

Blink count

The last parameter that is of our interest here is the number of blinks. Eye blinks have been the subject of different studies (including eye-tracking ones) and it is believed that the fewer blinks occur if a task requires more attention. It is because blink rate and cognitive load (i.e. load that is related to the executive control of working memory) are found to be inversely proportional. People blink less when cognitive load is at its peak because they do not want to miss any piece of information (or just anything) while blinking (Ledger 2013, see also Drew 1951).

According to the above, Student 1, who is less fluent in English, should experience more cognitive load than more fluent Student 2. The number of blinks for both of them is presented in Figure 19 below.
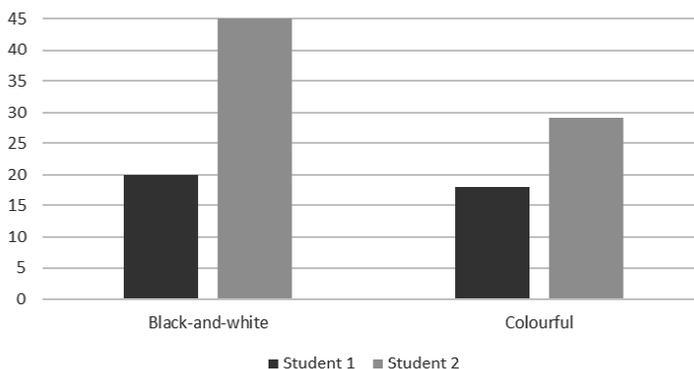
Figure 19. The number of blinks for both materials and both students.

A big difference in the numbers of blinks during both trials can be noticed. In the case of black-and-white material Student 1 blinked more than two times less than Student 2 (it should be remembered that Student 1 spent more time on completing the tasks than Student 2 so the real difference is bigger because Figure 19 does not relate the data to the time – see Figure 20). In the case of the colourful material still it is Student 1 who blinked less but the difference between both students is smaller. What is more, if to compare the number of blinks of Student 1 in both trials we will see there is almost no difference. However, Student 2 blinked much more when working with black-and-white material.
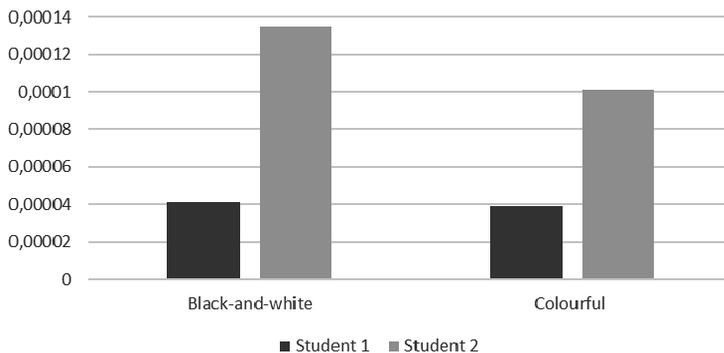
Figure 20. The number of blinks in relation to time for both materials and both students.

In Figure 20 quite big differences can be seen. It turns out that when working with both materials Student 1 was blinking much less often. The parameter decreased only slightly in the colourful material. Student 2 who blinked much more than Student 1 in black-and-white, decreased the number of blinks while working with the colourful material.

On the basis of the above data and the assumption that cognitive load is inversely proportional to blink rate it can be assumed that the level of cognitive effort for Student 1 was much higher than for Student 2. However, the change of colour set in colourful material probably required more cognitive effort from Student 2.

DISCUSSION

When discussing the results of the given above comparison it should be remembered that the textbook of English (as any other textbook) consists of textual, visual and graphic information. As such, the school student is obliged to choose a proper type of information needed at the particular moment. Sometimes, for example whilst completing the reading activity, s/he has to move their eyes from the areas of the page(s) that are full of content not related to the particular activity

that is being completed. In the case of less fluent students of English it may make the whole process of using the textbook more complicated because such students are not as self-confident as the fluent ones.

What is more, the above data is related not only to reading the given text, but to the whole process of completing the reading task which is located on two pages of the English workbook and textbook. The main difference between workbook and textbook is that the first one is in black-and-white and the second one is full of colours. It is expected that the layout influences the way students work with the textbook material. However, it should be once again emphasized that because the texts in both materials were not the same they cannot be fully compared. Though some tendencies in the eye-movement parameters in relation to the level of English language competency can be named.

However, the aim of the article is not to concentrate and compare/contrast both materials (this was done in some of my previous papers, for example Andrychowicz-Trojanowska 2016a) but to analyse the way a good and weak secondary school student of English complete the tasks given in the English textbooks and to answer the question what the differences are.

The differences that were noticed are related to time needed to Student 1 and Student 2 to complete the tasks, to fixation- and saccade-related parameters and blinks. The weaker student needs more time to complete the reading activity because of her lower speed of processing information given in English. She was also less confident when answering the questions and had to confirm the possible answers in the text and that was more time-consuming. Because of lower fluency in English she had to make more cognitive effort to acquire information and understand the content of the text and the meaning of particular words. This was reflected in the duration of fixations that were longer than for Student 2, as well as in the case of the maximum fixation duration.

Because Student 1 was less fluent in English she was not aimed at skipping any piece of information in the text or questions to the text. That is why there is a smaller number of long saccades by Student 1. The same reason can probably be given for smaller number of blinks by Student 1 in comparison with Student 2.

The blink rate that is connected with cognitive load and effort can also be related to the layout of both materials. The black-and-white one was blinked by both students more often than the colourful one (the difference is seen especially in the case of Student 2). It may mean that the structure and graphics of it were less disruptive for the students and did not require such a big cognitive effort from them. It is, however, different in the case of the colourful material that was blinked less often by both of the students. It seems that Student 2 had to make more cognitive effort to deal with it.

Summing all the above-mentioned up it can be said that the example of the two students shows there are the differences in eye movements related to the language skills as well as to the general fluency in reading, especially in a foreign language.

In our case Student 1, who was less fluent in both aspects, in fact did not make more fixations than the better Student 2, as it was assumed, although her fixations were longer (see also her fixation maximum above) and saccades shorter and that's typical for poor readers. Those who are more fluent in English are more likely to work with a textbook material in a more efficient way. If the textbook material is properly adjusted to the language level of a student, their cognitive effort and cognitive load are lower. Sometimes too much (unnecessary) effort may discourage a student from learning the language.

CONCLUSIONS

The above comparison of two students is only an example of differences occurring between them. Because the sample is very small it is not possible to draw any statistically relevant conclusions. However, the above-mentioned parameters show that the way students of different fluency work does differ. The less fluent student had to concentrate more and make more cognitive effort to complete the tasks. The better student made more fixations of shorter length which means that the effort was not that big as in the case of Student 1. What is more, Student 2 made more saccades which is an indicator of more self-consciousness and fluency.

That means it is worth analysing the eye movements of much bigger group of participants and on the basis of that it is worth drawing some applicable conclusions related to the way of working with the glottodidactic material in relations to the level of foreign language fluency.

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