

## ARTICLE

# The Effects of Typographic Features in Timed Reading Comprehension on Arab EFL Learners

Nada Algharabali 

*The English Department, College of Basic Education, Public Authority for Applied Education and Training, Ardhya 92400, Kuwait*

## ABSTRACT

The visual characteristics of timed English reading comprehension texts can impact Arab learners who are used to reading from right to left (because of their mother tongue Arabic). The present paper is an experimental study consisting of multiple reading comprehension tasks that examine different text layout variables, namely: interlinear spacing, font size, paragraph distinguishing numbers, and right margin alignment. Two experiments were set up to investigate the effects of visual text layout on reading efficiency. The participants (61 females and 59 males) are students from the English Department at the College of Basic Education, Kuwait. Both reading comprehension experiments were followed by group discussions to obtain qualitative insights of students' text layout reading preferences. Excel Sheet was utilized to process all quantitative data. The findings demonstrate that students perform better with font size (12pt.), compressed single interlinear spacing, and reading comprehension passages with numbered paragraphs. Moreover, not only were students' reading performances impaired by right rag alignment texts due to the habitual direction of reading Arabic from right to left, but also the students apparently favored paper-based reading comprehension tests in time-sensitive conditions. Future research could consider more seriously comparative studies between computer-based versus paper-based mediums of assessment, especially in terms of timed reading comprehension tests.

**Keywords:** Typography; Timed-Reading; Comprehension; Reading-Efficiency; EFL

### \*CORRESPONDING AUTHOR:

Nada Algharabali, The English Department, College of Basic Education, Public Authority for Applied Education and Training, Ardhya 92400, Kuwait; Email: nads\_50@hotmail.com

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# 1. Introduction

Perceptual and typographical factors affect several aspects of reading, such as speed, comprehension, and accuracy. Certain visual styles (text formats), such as specific fonts, font sizes, size of interlinear spaces, and length of lines, may make a text difficult to read<sup>[1, 2]</sup>. Presented with such texts, the reader usually takes some time to adjust their eyes to them. Although there are many research studies in this area<sup>[1, 3–6]</sup>, hardly any have dealt with timed reading comprehension by Arab EFL learners, especially given the added factor of learners being accustomed to reading from right to left rather than left to right (as in English).

Every year, the English Department at the College of Basic Education (CBE) accepts male and female students to study English linguistics and literature, provided they pass an English placement test. During their first year, students must attend an English reading skills course. They are therefore exposed to a great amount of reading comprehension tasks both when sitting for the placement test and when attending the reading course. It is worth adding here that placement test at CBE has been digitalized in the last two years. However, students are still frequently seen laboriously trying to decipher long passages with their index finger pointing at the computer screen. Note, however, that reading comprehension tests that are part of the reading course are still paper based. Therefore, an evolved set of text layout guidelines is needed to facilitate legibility during reading comprehension tasks in test situations. For the purposes of the present paper, which looks at the effect of typography on reading comprehension, a pilot experiment was conducted to find the best procedure to test typographic features and their influence on reading efficiency. A second experiment manipulating different visual variables of text layout was also carried out to help the researcher determine their effects on reading speed, comprehension and information retention.

Accordingly, the present paper describes experiments that explore and help determine the typographic features required for the ideal layout of EFL reading comprehension tests. The present research was triggered by the following questions: How do typographic characteristics of a text influence the ease with which an EFL learner reads and understands a reading comprehension passage? Faced with challenging text layouts, how will an EFL learner cope with a ‘timed’ reading comprehension task in stressful test con-

ditions? Moreover, how will the less familiar direction of reading English (left to right) affect the reading speed and comprehension performance of an Arab EFL learner, whose habitual reading direction is right to left? The present study has methodically answered these questions and obtained students’ perceptions on how typographic text features impact their performance during timed reading test situations.

# 2. Literature Review

The existing research on typography in reading comprehension mainly looks at its effect on reading efficiency in general, without considering aspects such as its influence on the learner’s habitual direction of reading, if different than English (e.g., right to left). Also, most recent empirical research compares variables of printed text format versus digital screen text format. This is becoming ever more important because of the increasing global digitalization of language tests<sup>[7–12]</sup>. There are, however, still numerous paper-based reading comprehension tests (as is partly the case in the present study). A quick review of the existing experimental studies shows that certain typographic text layout features significantly affect speed and accuracy in reading comprehension tests.

An experiment by Chelesnik<sup>[3]</sup> tested four typographic variables (typeface, type size, interlinear space, white space), which were used to measure students ‘academic achievement’, ‘typographic preferences’, and ‘anxiety levels during tests’. The study concluded that factors such as achievement and anxiety were unaffected by using different typographic features during tests. On the other hand, significance was found regarding students’ typographic preferences: 12-point type size (pt.) and ample use of interlinear space and white space. As a result, the researcher was led to question the lack of logical correlation between the results of the three factors being considered during tests and students’ preferences in general (in his words):

‘It seems logical that if the students strongly prefer certain typographic features, that the preference would impact some other aspect of test-taking’ (<sup>[3]</sup>, p. xi)

Additionally, an experimental study by Lonsdale et al.<sup>[4]</sup> confirmed that participants completed timed reading

tasks much faster and more accurately when a text layout applied reader-friendly legibility guidelines, such as reasonable line length, adequate line-spacing, and precise separation of paragraphs<sup>[13]</sup>. Lonsdale<sup>[2]</sup> reached the same conclusion by emulating a similar study and experimental design. However, the variable of time constraints was not considered in this case, and the focus was directed more towards general reading as opposed to test situations. Also, an early study on the use of different font types concludes that there are few significant differences in legibility when using Serif versus Sans-Serif fonts but that Serif fonts seem to improve information recall during reading<sup>[14, 15]</sup>.

A more recent study looked at different font types in reading comprehension, albeit from a different angle. A study by Dykes and Hauca<sup>[16]</sup> employed a unique and hard-to-read font type known as ‘Sans Forgetica’ to create a disfluent text reading situation to see whether this challenge could increase reading comprehension and information recall among Japanese EFL learners. Their study concluded that utilizing this font type decreased reading speed compared to other easier-to-read fonts, such as Centaury Schoolbook font, and that there was no significant difference in comprehension and information recall between the two fonts when administered in reading comprehension.

An interesting study conducted by Soleimani and Mo-hamadi<sup>[1]</sup> examined the relationship between font type, font size, line-spacing, and legibility during EFL timed reading comprehension. This study was carried out on Iranian participants, and since Persian, like Arabic, reads from right to left (RTL), their study could have considered whether the opposite direction of reading flow left to right (LTR for English) affects ease and speed of reading, but it did not. The study concluded that font size 12 pt. is preferable to smaller sizes (such as 10 pt.), is easier to read, and facilitates information recall, thus confirming the results of numerous other studies<sup>[5, 6]</sup>. In fact, to the knowledge of the researcher, there are no investigations that appear to explicitly explore Arab learners’ English reading typographic preferences (based on their habitual reading direction, RTL). One study to date has focused on the effect of text direction on the legibility of Chinese texts (which can sometimes be different than English’s LTR) by Chinese participants<sup>[17]</sup>. They concluded that text direction and character size do indeed influence search time of target words and impact eye fatigue. There-

fore, it is hoped that adding a new factor in the present study, namely justified alignment versus right rag (the margin at the right side of a reading passage), may address the relative paucity of empirical studies related to typographic effects on reading efficiency while keeping in mind the habitual reading direction of the learner. In light of this, the present study attempts to answer three research questions. First, to investigate the extent to which reading efficiency is affected by certain typographic features in ‘timed’ reading comprehension tasks? Second, explore whether the Arab learner’s habitual reading direction (RTL) is impacted by certain typographic features when reading English texts? Third, find out the ideal typographic characteristics that could enhance student performance on the English Department’s current English placement test at CBE.

### 3. Methodology

#### 3.1. The Pilot Test

Since legibility and comprehension are not always readily observable, the study began with an experiment to explore and gain insights into the variables that affect reading efficiency under pressure of time. Two different intermediate reading passages were chosen [topics: Seat Belts (369 words) And Winter Time (326 words)]. Each topic was presented in a different layout:

1. Passage (A) ‘Seat Belts’: single line-spacing, font size 12, numbered paragraphs.
2. Passage (B) ‘Winter Time’: 1.5 line spacing, font size 14, paragraphs not numbered.

Both passages were presented in Arial font. Arial was chosen because it is popular and – like Times New Roman – has Arabic versions that are similar in visual style and structure. This familiarity with the text allows EFL Arab readers to focus fully on comprehension rather than being presented with an unfamiliar font style.

Each of the two reading passages had ten multiple-choice comprehension questions. At the end of the reading test, the participants were presented with three questions about the layout of the text that they could answer among each other during a group discussion:

- 1) Which layout is easier to read?
- 2) Which layout helps you locate answers more quickly?

3) Which text appearance do you prefer?

## Participants and Procedure

All the students taking part in the pilot study gave their participation consent after I (the researcher) clearly explained to them the pilot test's purpose, tasks and entailments. Ten female and ten male students from two different (gender-segregated) 'Reading' classes volunteered to take part in the pilot study. They were aged 18 to 23. All were Kuwaitis, and Arabic was their first language. They were given the two reading comprehension tasks and were instructed to use the stopwatches on their phones to time the process. They had to time themselves twice: first after reading each passage and then after answering the comprehension questions of each passage. Afterwards, I was engaged in a group discussion with the students over the three layout questions mentioned above. Quick notetaking helped document students' perceptions during the group discussion, and these notes were later fully transcribed. A closer look at data collected from the pilot study experiment, the number of errors made on the reading comprehension questions, and the students' feed-

back during the group discussion helped me determine the variables to be investigated in the main study and the data collection methods.

## 3.2. The Main Experiment

The pilot study's results led to the employment of a different approach for the main study. For the main experiment, only one intermediate reading comprehension passage was used ('Dancing', a three-paragraph long passage of 233 words; see **Appendix A**). Unlike the previous passages (see Section 3.1), the present passage had only three multiple-choice comprehension questions. The decision to minimize the comprehension questions was made because I observed that the ten comprehension questions previously utilized in the pilot study seemed to place more focus on the aspect of passage comprehension rather than the efficiency of timed reading. In addition to that, the passage was presented in five different layouts using Times New Roman font. **Table 1** below, shows the five variables under investigation.

**Table 1.** The table shows five layouts representing the five variables analyzed in the present study.

Passage	Font Name	Font Size	Line-Spacing	Alignment	Numbered Paragraphs
A <i>*Placement test layout</i>	Times New Roman	12	Single	Justified	Not numbered
B	Times New Roman	12	Single	Justified	Numbered
C	Times New Roman	12	1.5	Justified	Numbered
D	Times New Roman	12	Single	Rag right	Numbered
E	Times New Roman	14	Single	Justified	Numbered

All five reading comprehension papers were coded 'A, B, C, D, E' on the top left corner of each paper making them easier to identify at a glance. As mentioned earlier, only one reading comprehension topic was utilized in order to ensure that all students were subjected to the same language content and comprehension questions.

## Participants and Procedure

All the students taking part in the main experiment gave their participation consent after I clearly explained to them the main experiment's purpose, tasks and entailments. The participants in the experiment consisted of 61 female and 59 male students. Each student received one version of the reading comprehension task. The researcher also asked

students to use the stopwatches on their phones. They were instructed to time themselves twice:

1. Once after reading the passage
2. Once after answering the reading comprehension questions.

I then discussed the three comprehension questions with the students. For each of the five reading comprehension versions, three variables were established:

- 1) Legibility, measured as time taken to read the passage in minutes and seconds.
- 2) Ease of comprehension when answering the questions, measured in minutes and seconds.
- 3) Quality of comprehension, measured as the number of correct answers out of three, 33%, 66%, and 100% correct.

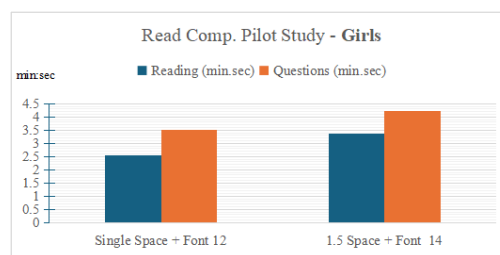
I then asked students from two gender-segregated reading classes if they would be interested in and consent to participating in a group discussion over the text layout of the reading comprehension task. Fifteen male and fifteen female students agreed to take part. Three groups of five (male and female) students were formed. Each student was given one copy of the five versions of the reading comprehension task. The students were encouraged to exchange ideas and discuss their thoughts with regards to the five different text layouts. The researcher took detailed notes during the group discussion in each group, and all were later fully transcribed. The pilot experiment and main experiment's results were entered into an Excel spreadsheet to calculate the sum, average, and percentage of difference. The samples were first entered into groups based on the organization: placement test, single space, 1.5 space, non-justified, and font size 14 (see **Table 1** above, for definitions of the five text layout features utilized for the main experiment).

## 4. Results

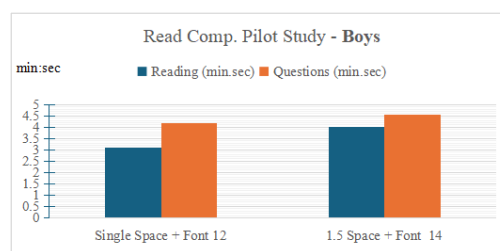
### 4.1. The Pilot Study

This study aimed to determine if using certain typographic features in the text layout of reading comprehension passages could increase the efficiency of reading in test conditions, especially in the case of Arab EFL learners who are used to reading from RTL. As mentioned earlier, regarding the pilot study, two variables were employed to control the text layout features of the two passages (see Section 3.1). The pilot study showed that students read passage A (Seat Belts), presented in single line spacing, faster than passage B (Winter Time), which had 1.5 line spacing. The average reading speed of male students for passage (A) was 3:11 min:sec (min:sec = minutes and seconds). The average duration of answering 10 multiple-choice questions for passage (A) was 4:17 min:sec. The reading speed of passage (B) was 4:03 min:sec and the average duration of answering the questions for passage (B) was 4:56 min:sec. For female students, the averages of reading speed and answering questions of passage (A) were 2:53 min:sec and 3:51 min:sec, respectively. In comparison, the averages of reading speed and the duration of answering questions for passage (B) are 3:36 min:sec and 4:55 min:sec, respectively (see **Figure 1**, and **Figure 2**, below). The above figures can be tabulated as shown in

**Table 2**, below.



**Figure 1.** The figure shows the duration of reading and comprehension questions answered.



**Figure 2.** The figure shows the duration of reading and comprehension questions answered.

### The Pilot Study: Group Discussion

The students' group discussion revealed that 8 out of 10 (80%) of the female students regarded passage (B) (Winter Time) as 'easier on the eyes,' 'quicker to read,' or 'better for information recall' than passage (A), even though passage (B) is slightly longer. According to their comments, the absence of paragraph numbers in passage (B) did not make any difference to the female students. Only 20% of the female students thought that the numbered paragraphs of passage A made extracting information needed for the comprehension questions easier and quicker. Interestingly, 90% of the female students regarded the topic of passage A (Seat Belts) as male-oriented, whereas passage B (Winter Time) was felt to be gender-neutral. This gender difference of appeal was thus considered when choosing the topic for the main experiment.

Unlike the female students in the present study, the male students were quite divided. One-half of them thought that passage (A) was easier and quicker to read and extract answers to comprehension questions 'without any need to flip back and forth since everything was on the same page and therefore more time efficient.' They insisted that having a passage that 'appeared' longer (like passage B) could make them anxious when pressed for time. However, the other half

**Table 2.** The table shows the two text layouts tested in the pilot study and their results.

Passage	Font Name	Font Size	Line-Spacing	Paragraphs Numbering
(A) Seat Belts	Arial	12	Single	Numbered
Passage (A): <b>Male</b> Reading time: 3:11 min:sec Answering time: 4:17 min:sec			Passage (A): <b>Female</b> Reading time: 2:53 min:sec Answering time: 3:51 min:sec	
(B) Winter Time	Arial	14	1.5	Not numbered
Passage (B): <b>Male</b> Reading time: 4:03 min:sec Answering time: 4:56 min:sec			Passage (B): <b>Female</b> Reading time: 3:36 min:sec Answering time: 4:55 min:sec	

of the male students felt that passage (B) was much easier to read because ‘our eyes and brains were not overtaxed during reading’ and ‘the text was not crammed into one page’. Therefore, interlinear single space and smaller font size were regarded as ‘cramming’, even though single space is usually the standard spacing for printed and typed texts. One student, when reaching the end of a line, had difficulty finding the beginning of the following line and had to use his index finger to avoid losing track of the lines. This last group of students also stated that passage (A) could be according to them:

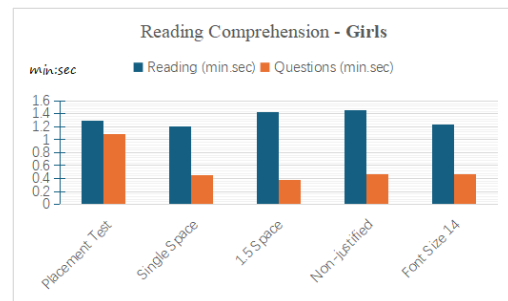
‘frustratingly eye-straining to read during a test’ since the ‘lines appeared too compact’ which ‘could be even harder during a computer-based test’.

## 4.2. The Main Experiment

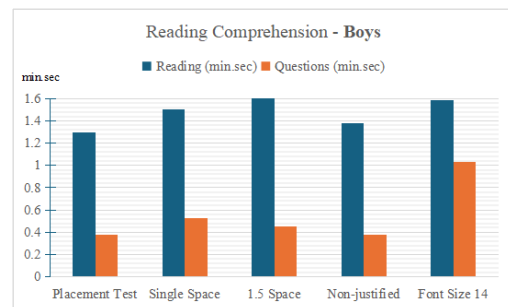
Unlike the pilot study (see Sections 3.1 and 4.1 above), the second experiment included five versions of the same, gender-neutral passage topic: ‘Dancing’, which was presented utilizing the five different layout features being investigated in the present study (see **Table 1**, above). The data gathered from this experiment with 59 male and 61 female students showed significant differences. The female students found passage B (single-spaced) the quickest to read with an average of 1:21 min:sec, followed closely by passage E (font size 14 pt.) at 1:24 min:sec, and passage D (non-justified) at 1:30 min:sec. The female students also found reading passage D (non-justified) at 1:45 min:sec to be the most time-consuming (see **Figure 3**, below).

As for the male students, they found passage A (the

placement test format: single-spaced, font-size 12 pt.) the fastest passage to read at 1:30 min:sec, followed by passage D (non-justified) at 1:38 min:sec, and passage B (single-spaced) at 1:50 min:sec. They also found passage E (font size 14 pt.), at 1:59 min:sec, was the most time-consuming to read (see **Figure 4**, below). It is noteworthy that male and female students’ results in terms of reading speed for passage (A) are identical at 1:30 min:sec. For a comparison between male and female students, see **Figure 5**, below.



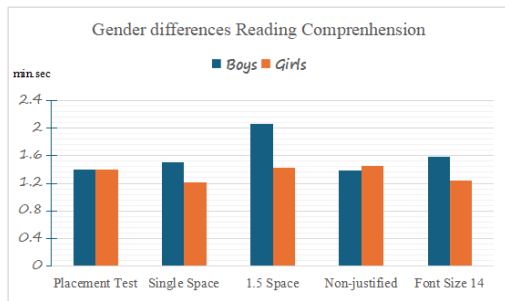
**Figure 3.** The figure shows the duration of reading and comprehension questions answered.



**Figure 4.** The figure shows the duration of reading and comprehension questions answered.

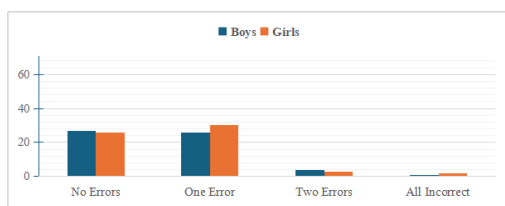
The duration of time taken to answer the three comprehension questions does not match the duration pattern of average reading time. This is true across all results for

both male and female students, even though the questions are the same in all five versions of the reading comprehension assignments (see **Figures 3 and 4**). In other words, female students took the longest to answer the three questions on passage A (placement test) at 1:09 min:sec, and the least time to answer the questions on passage C (1.5 line spacing) at 38 seconds, however the reading durations results of these two passages are quite different in terms of speed (see **Figure 3**). Male students, on the other hand, averaged as long as 1:03 min:sec for passage E (font size 14) and 38 seconds for reading passage A (placement test, see **Figure 4**).



**Figure 5.** The figure shows a gender comparison of the reading duration.

The number of errors made on all five samples by male and female students is quite similar (as shown in **Figure 6**, below). A total of 43% of female and 46% of male students made no comprehension questions errors, and 30% of female and 44% of male students had only one error. At the same time, only 3% of female and 2% of male students got all three questions wrong (see **Figure 6**).



**Figure 6.** The figure shows gender differences in number of errors made on the three comprehension questions.

## Group Discussion of the Main Experiment

While the content of the reading passage (Dancing) was deemed gender-neutral by students, male and female students appear to have different preferences when it comes to the textual layout features of the reading comprehension passage. Unlike female students, 80% of the male students regard a non-justified reading passage as ‘messy and harder

to read’ than justified passages. Additionally, according to perceptions from the group discussion, 70% of the male students feel it does not matter whether the paragraphs are numbered or not, provided the ‘test is paper based as this facilitates finding answers more quickly’. They also strongly favor single-line spacing and font size 12 pt. Moreover, 80% of the male students believe that when larger line spacing (i.e., 1.5 line spacing) is used, it can make a passage appear larger and more time-consuming, especially when looking for information to answer comprehension questions. A significant 90% of the male students adamantly oppose font size 14, perceiving it as ‘childish,’ ‘like going back to elementary school,’ ‘unacademic,’ and ‘seemed almost insulting’ to them as college students.

On the other hand, 90% of the female students felt indifferent about a non-justified passage, and 50% perceived a font size 14 reading passage to be according to them:

‘a lot easier to read’ and ‘facilitates finding answers to comprehension questions quickly and more efficiently’

Moreover, 90% of the female students strongly felt that it is of utmost importance to have numbered paragraphs no matter what line spacing or font size is utilized. Also, 100% insisted that paragraph numbering was essential especially during a computer-based test, where it is not possible to ‘mark,’ ‘underline,’ or ‘write margin notes’ on the reading comprehension passage as one could in a paper-based test.

## 5. Discussion

The present study explored whether typographic features employed in reading comprehension passages could affect legibility during test situations, especially in terms of reading speed and comprehension. It also sheds light on Arab EFL learners’ text layout preferences, and whether reading English (LTR) could be impacted by use of certain typographic features, specifically in timed conditions. Similar to Chelesnik’s<sup>[3]</sup> observations, the findings in this study, which were obtained via reading comprehension experiments and group discussions, revealed some discrepancies between students’ performances in the two methods of data collection. For example, during group discussions, male students made plain their aversion against reading passages that are not

justified, however, according to their performance with the non-justified text, their speed of reading and answering comprehension questions were relatively faster in comparison to the other typographic variables being tested (1:38 min:sec and 38 sec, respectively, see **Figure 4**). Another discrepancy was found between the faster reading of the font size 12 pt. text and the perceptions of numerous male students who preferred the less cramped font size 14 pt. text (see **Figure 5** and Section 4.2.1).

Additionally, the findings in the present study appear to agree once again with studies stating that a larger font size 12 pt. is preferable for learners than the smaller font 10 pt.<sup>[1]</sup> It is widely acknowledged that the easier it is to read a reading comprehension text, the more likely it is to enhance learners' performance<sup>[18, 19]</sup>. However, in the present study, font size 12 pt. was treated as the smaller font and yet it remained the preferred font among students. In other words, in Soleimani and Mohammadi's<sup>[1]</sup> comparative study the 'larger' font size 12 pt. was the preferred size whereas in the present study the 'smaller' font size 12 pt. is the preferred size. This raises the question, is font size 12 pt. truly the preferred size for timed reading comprehension texts or is it the preferred size in comparison with other font sizes being examined in study? In the present study, for example, female students showed only a minimal difference in speed of reading between reading passage font size 12 pt. (for passage A, 1.30 min:sec) and reading passage font size 14 pt. (for passage E, 1.24 min:sec, see **Figure 3**).

One of the significant findings in the present study is the relatively similar results for both male and female students in terms of reading speed results for passage (A) which follows the placement test layout (note: with no numbered paragraphs, see **Figure 5**). What is interesting here is that a large number of male and female students strongly stated during group discussions of both the pilot study and main study that numbering paragraphs (while not the case in the actual placement test: passage A) allows for more efficient location of information especially when answering timed comprehension questions in computer-based tests. This point is evidenced by the relatively long time taken to answer the comprehension questions of passage (A) by female students (1.09 min:sec, see **Figure 3**). In fact, one could argue that this finding is one of the main contributions presented by this study given that there is hardly any research (known to the

researcher) on the efficiency of distinguishing paragraphs via numbers in reading comprehension passages, since paragraphs are actually not always numbered.

Another under-researched aspect of typographic features is the right alignment in reading comprehension passages. The present study looked at the typographic variable 'justified text alignment' versus 'right rag alignment' – as one of the focal points, especially seen as paragraphs with a straight or ragged right margin could influence an Arab learners' habitual reading direction (RTL). The results in **Figure 5**, demonstrate that male students were least affected by non-justified passage D (1.38 min:sec, as it was the fastest read text), while female students were the most affected by non-justified passage D (1.45 min:sec, which relatively speaking was the slowest read text). Despite the results which show opposing performances between male and female students, the findings indicate that reading passages with a right-rag margin could somehow affect Arab EFL learners' reading speed in timed test situations. This significant finding confirms the researcher's presupposition: since Arab EFL learners are used to reading RTL due to their mother tongue, reading an English text (LTR) with a straight right margin (i.e. justified alignment) may be easier than reading texts with a right-rag margin, especially when the reading is timed. It is noteworthy however, that although a non-justified passage did not affect male students reading speed (see **Figure 5**), their perceptions according to group discussions indicate a very strong preference towards 'justified alignment' (see Section 4.2.1).

## 6. Conclusions

In conclusion, the present study contributes to the growing research in EFL investigating methods of achieving reading efficiency during reading comprehension test conditions. Overall, the findings suggest that students perform better with font size 12 pt. and single interlinear spacing in reading comprehension texts. More importantly, students' performances and insights show that paragraphs in reading passages must be numbered for efficient location of information, especially in the case of computer-based tests. This last finding will be suggested as one of the text layout guidelines required for the reading comprehension English placement tests at the English Department, CBE. This aspect also mer-



its further research to establish to what extent it could be a helpful tool in timed reading comprehension assignments.

Additionally, according to students' perceptions from group discussions, a conclusive finding was the notable preference towards paper-based reading comprehension tests rather than computer-based tests. This significant point confirms similar findings by Yu et al.<sup>[7]</sup>, which compare reading comprehension performances in the two testing mediums. In hindsight, this last point could have yielded more precise results had the present study included a larger scale, two-pronged research method in which students would be exposed to computer-based versus paper-based reading comprehension tasks. Future research could address this point by including a comparative study between the two testing mediums focusing on the effect of typographic features of Arabic and English's opposing reading directions and their influence on reading efficiency in test conditions, a novel research point up until now. One of the limitations of this study was the decision to utilize the typographic feature font size 14 pt. as a variable, especially since none of the available research has examined this font size as a variable. In fact, font size 14 pt. is not commonly used in printed materials and textbooks. A good number of students in this study even deemed it as 'more time-consuming' and 'ill-suited for college-level students'. And finally, 'There's always strength in numbers', a larger student sample size would undoubtedly be an added benefit for a study of this type.

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## Institutional Review Board Statement

Not applicable.

## Informed Consent Statement

Informed consent was obtained from all subjects involved in the present study.

## Data Availability Statement

The data gathered and analyzed for the present study are available from the corresponding author upon reasonable request.

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## Conflicts of Interest

This author declares no conflict of interest.

## Appendix A

The reading comprehension (Dancing) task used in the main experiment

1. Most people like to dance. This may be because moving the body in a rhythm is a natural way to show our feelings. Look at children for example, they often jump up and down when they are excited about something. Sometimes they move back and forth quietly when they are relaxed, a bit like dancing. Dancing is also lots of fun because many people like to dance just to enjoy themselves.
2. Every culture has its own traditional dance. The people of each culture add specific moves, jumps and steps to the dance. Some dances became very formal with rules that the dancers have to follow. The first formal social dances were held in Japan 1,500 years ago. Additionally, dancing plays a major part in many holidays and festivals around the world. For example, in the spring, the people of Central and South America celebrate a holiday called 'Carnaval'. For five days, people of all genders and ages dance in the streets wearing beautiful costumes to a kind of music called Samba.
3. Nowadays, there are dance competitions that take place both nationally and internationally. There are

several dance competitions; one popular type which includes a diversity of dance styles is the TV program 'So You Think You Can Dance'. Another famous type of dancing competition which focuses exclusively on ballroom and Latin dance, is the TV program 'Dancing with the Stars'.

#### Questions:

- 1) 'Samba' is a type of \_\_\_\_\_?  
 a) Dance    b) Music  
 c) Food    d) Costume
- 2) Dance competition can be \_\_\_\_\_?  
 a) National only    b) International only  
 c) National & international    d) None of the above
- 3) Children jump up and down when they are \_\_\_\_\_?  
 a) Focused    b) Reading  
 c) Thinking    d) Excited

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