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Investigating Pausology of Lower-intermediate and Skilled EFL Learners' Writing and its Relation to Writing Genres: A Keystroke Logging Study

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ABSTRACT
Writing has been a challenging skill for EFL learners to master since they need to learn not only lexical and grammatical resources but also planning and idea presentation in different genres. In this regard, pausological details of a piece of writing (i.e., where and when the pauses take place) can provide a bulk of information about EFL learner's writing behavior. The present study was, therefore, conducted to examine the pause duration and location of lower-intermediate and skilled EFL learners' writing and their relation to writing genres. For the collection of data, 20 EFL learners (10 lower-intermediate and 10 advanced) took part in the study. Using keystroke logging, writing tasks on five genres of descriptive, personal narrative, argumentative, and persuasive text, as well as a job application, were given to the participants. The recorded data included the percentage of pause duration and pause location (within words, before words, before sentence, and before paragraph) of the lower-intermediate and skilled L2 writers. The statistical analysis of the data indicated that although there was no significant difference between the two groups regarding the overall means of pause duration on five genres, the advanced group had higher means on job application and persuasive writing. Moreover, significant differences between groups on different types of pause locations were found between the two groups. Practical implications for education are further discussed.

Keywords: Pause, Writing, Genre, Pause location, Pause duration

1. INTRODUCTION

The process of writing is not as simple as taking a pen and paper and starting to write. It is, in fact, a central element of language that makes the writers use both their mental and cognitive skills to organize a coherent written text (Schoonen et al., 2003). As a result, writing is considered to have a direct relation with cognitive processes as Kellogg (1994) stated that "writing is viewed as an exemplary form of human thinking, involving problem-solving and decision-making within clearly defined goals" (p. 13). This shows that the focus of methods applied in teaching writing has shifted from product to process, a shift to what the writer does when composing a text writing (e.g., planning, revising, and pausing) rather than the final product (e.g., fixed patterns of organization, spelling, and grammar, based on Lingdren and Sullivan (2006).

Being involved in cognitive processes, writers spend a significant amount of time choosing a step to take to present their idea. This selection process leads the writers to physical inactivity (i.e., to a pause), where the researchers need to explore when, where, and how long the writers halt to plan and/or make a pause in their texts. In other words, pauses are considered as evidence of the speaker's route to achieving "the adequate verbalization of his thoughts" (Chafe, 1980, p. 170). Therefore, a close look at pauses can shed light on variables which pertain to timing in the language (utterance rate and duration, frequency and duration of pauses, Grosjean, 1980, p. 39),

These timing and process data, such as pauses during a writing task, call for new methodologies and conceptualizations to analyze process-based evidence that is not traditionally used or readily available in psychometric analyses and present new challenges to investigators. Part of the complexity in analyzing such data stems from making meaningful interpretations and valid inferences about the cognitive processes undertaken between a task and a response, which further involves disaggregating the cognitive processes from other factors, such as emotions and motivation (Leighton, Tang, & Guo, 2017). Data management, as another critical component for process data-based research and analyses, can also be a challenge faced by researchers

(Hao, Smith, Mislevy, von Davier, & Bauer, 2016). Compared to a single score or a final response for an item, process data contain far more information that should be structured in a way that can meet the analysis and validation needs.

So as to add a further dimension to the previous findings on pausology, it is hypothesized that the level of learners' proficiency can affect the pauses they make in the processing of writing tasks. Moreover, the current study aimed to investigate the way pause behavior interacts with the genre of the writing task in advanced and lower-intermediate EFL writers. Accordingly, pausology of advanced and lower-intermediate writers might provide meaningful insight into the process involved in writing different genres. With this in mind, the current study investigated the pause duration of lower-intermediate and advanced L2 writers of English using process data of the keystroke logs collected during writing tasks of different genres. All the key presses during the genre-generation process, from within word to after paragraph points were recorded using a keystroke log. The advantage of keystroke logging is that data are collected in the background without inserting any obvious interference with the writer's performance or thinking process (Leijten & Van Waes, 2013).

2. Background

2.1. Writing genres

Genre is broadly defined as "abstract, socially recognized ways of using language" (Hyland, 2007, p. 149) and is considered as "one of the most important and influential concepts in language education" (Hyland, 2004, p. 5). Genre-based pedagogy draws on the wider social context of writing which takes into consideration notions, such as target discourse community and determination of the text. Currently, several genre theories and pedagogies exist, which have been extensively discussed in the related literature (e.g., Belcher, 2004; Hyland, 2004, 2007; Johns, 2008; Paltridge, 2001).

Genre, as both a cognitive and cultural concept, is frequently defined as an abstract, goal-oriented, staged, and socially recognized way of making use of a language delimited by communicative purposes, performed social (inter) actions inside rhetorical contexts, and formal properties (i.e., structure, style, and content, Berkenkotter & Huckin, 1995; Bhatia, 2004; Halliday, 1994; Swales, 2004).

Growing knowledge on the role of social contexts in writings has made the researchers focus on genre-based approaches which mainly discuss that the written material is formed based on the writer's internal processes since the writer is a social being (Hyland, 2007; Johns, 2002). Academic genres enable L2 learners to produce and comprehend written texts considering specific social contexts. According to this point of view, writing is a recursive process that involves the individual background of the writer, the role of the writer, and the contextual features (Johns, 2003). Consequently, genre-based education concentrates on "developing learners' awareness and critique of communities and their textual practices" (Johns, 1997, p. 19).

Genre awareness pedagogy can make available a substitute approach to genre acquisition. Genre acquisition differs from genre awareness; accordingly, the former adopts genre as rebuilding template forms (Johns, 2011), while the latter involves continuous comprehension of genre and writing in general (Devitt, 2004). In genre acquisition, the students learn rhetorical flexibility which enriches them with rhetorical awareness of new contexts (Johns, 2008). Through genre acquisition, the students acquire strategies to transfer knowledge from one writing context to another using metacognitive knowledge (Negretti & Kuteeva, 2011). The L2 learners use metacognitive knowledge to adapt, apply, and assess cognitive strategies when they want to perform genre-based tasks in various circumstances.

Since students in academic situations are required to write specific types of paper, such as argumentative, descriptive, or narrative (Hafner, Miller, & Ng, 2013), they are confronted with problems while producing a text of any type and adapting it to the larger context of academic paper. Students at the university level in many disciplines are frequently expected to write from source texts (Davis, 2013; Keck, 2014; Shaw & Pecorari, 2013). According to Hirvela and Du (2013, p. 87), adapting source texts into their own writing can be challenging as it requires them to engage in "complex reading and writing activities and makes contextualized decisions as they interact with the reading materials and the assigned writing tasks."

2.2. Pause pattern

The pause analysis looks at every non-scribal period. The pause threshold can be set to any user-defined level (e.g., zero, one, two, or five seconds). For the analysis of pauses in writing, an arbitrary lower threshold of 2 seconds is applied in the existing computer keystroke logging research (e.g., Alves, Castro, de Sousa, & Stromqvist, 2007; Wengelin, 2006; Wengelin et al., 2009). Pause data are generated a) on a more general level (number of pauses, as well as mean values and standard deviations of pause lengths), b) on a more specific interval level in which the writing session is divided into 10-time slots, c) on the text level, that is, within and between words, sentences, and paragraphs, and d) the number and length of pause bursts.

Pauses can be investigated from different aspects. For instance, Prunty, Barnett,Wilmut, and Plumb (2014) examined the pauses based on three separate analyses: "1. The categorization of pauses into time-frames and

taken as a percentage of the overall pause time. 2. An analysis of the location of pauses to ascertain wherein the writing process the pauses occurred. 3. An examination of the frequency and duration of pauses" (p. 2897).

Based on the taxonomy of the pauses developed by Wengelin (2006), the pauses are investigated based on their contexts. For instance, this taxonomy distinguishes inactivity between the letters within a word, between a letter and punctuation, between a letter and the space followed by the letter. Baaijen, Galbraith, and de Glopper (2012) developed pause criteria by calculating the time between words, measured from the last letter in the first word to the first letter in the second word, from the raw interval data. Results of previous studies have indicated that the length of a pause burst correlates with the length of the pause just prior to it (Spelman Miller, 2006), and the length of pauses, in turn, correlate with the clause and sentence boundaries (Spelman Miller, 2006; Wengelin, 2002).

Spelman Miller (2000) attempted to identify potential discourse function of certain units in the text, such as a nominal in the subject or adjunct position, initial clause structures, and disjuncts and conjuncts. He called these certain units as 'framing devices' that allow us "to interpret pause location from an alternative discourse perspective. In this way, we intend to relate temporal features of the writing behavior of subjects to strategies they may use in developing and framing topic" (p. 133).

According to Lindgren, Sullivan, Lindgren, and Spelman Miller (2007), "the significance of these framing device categories for the study of writing processes is that it offers a layer of interpretation beyond the purely grammatical in describing the language, which is produced online. This allows the researcher to identify patterns of production and to relate pausing and formulating behavior to discoursal features of the language being produced" (p. 93). By defining a pause as to be 2 seconds, some long interesting phenomena may be misunderstood and misinterpreted. Sahel, Nottbusch, Grimm, and Weingarten (2008) argued that in compound words, the time interval between keystrokes at the conjunction boundary was longer than the mean/median in non-transparent words for German writers writing in German.

It should be noted that pause durations in keystroke logger data cannot provide information about the underlying cognitive processes (Spelman Miller, 2006). In the logs, a moment of inactivity gives no data on what the writer was carrying out during that time; s/he could be planning a sentence, searching through a mental lexicon, or rereading the written text. While rereading can be controlled, for example, with eye-tracking, keystroke logging remains an indirect measurement of the employed processes. As such, keystroke logging is predominantly interested in patterns of pauses, how they relate to the grammatical forms and working memory, and questions, like how long bursts of texts can be produced.

In the majority of the literature, the pause has been defined as 2 seconds of inactivity in this context. One of the reasons is that it is twice the mean typing rate (Wengelin, 2006). According to Wengelin (2006), the mean transition time between lower-case letters within words in the Swedish Spencer corpus varied from 181 ms for university students to 568 ms for fourth graders. In the English R&W corpus, the variances were alike in which the median typing speed of the fastest and slowest writers were 247 and 488 ms, respectively. It must be noted that there can even be significant intragroup differences in terms of typing speed. The university students had an SD value of 0.032 ms while the fourth graders had an SD value of 0.232, and this shows the intragroup heterogeneity. Therefore, these different groups may not be comparable.

Pause plots in L2 writing have been investigated in several studies. Xu and Qi (2017) investigated pauses in computer-assisted EFL writing. They used computer keystroke logs to investigate how writing skills affected the pausing patterns of L2 writers. They aimed to gain insights into L2 writers' management of the cognitive writing processes. They recruited 59 students of a college English course at a key Chinese university and divided them into two groups of more-skilled (n=29) and less-skilled (n=30) students. The two groups completed an argumentative essay in a computer classroom where Inputlog (version 6.0) was installed to log their writing activities. They set the pause threshold at two s and examined both the global and interval pausing patterns by dividing each writing event into five equal intervals. They also investigated how the final text quality was related to the pausing patterns. The results showed the significant influence of writing skills on the interval pausing patterns but not on the global pausing patterns. The interval pausing patterns had a significant correlation with the final text quality. Furthermore, the interval pausing patterns exposed significant incongruities in L2 writers' management of writing processes as one writing process dominated at specific intervals while there were interactions and shifts between other processes recursively.

Rosenqvist (2015) carried out a study to analyze keystroke logging data collected from middle school learners (n=46) in northern Sweden, Norway, and Finland. He queried the traditionally defined usefulness, comparability, and validity of pauses to investigate the underlying cognitive processes in the course of writing. By examining the raw computer keystroke log data, findings revealed that the group had a large variance in typing speed between participants and that different textual contexts had large variances in contrast to each other. Through exploration of the effects of different pause definitions on the text, it could be concluded that twice the median length of pause (median ×2) was a good measurement for investigating pauses in sentences. Further, the 1.5 times the median (median ×1.5) for pauses between keystrokes within words proved useful for investigating the production of individual words.

2.3. Keystroke logging

A computer-based tool for providing a mass of detailed information data on pauses involved in the process of writing is keystroke logging (Strömqvist, Holmqvist, Johansson, Karlsson, & Wengelin, 2006; Sullivan & Lindgren, 2006; van Waes & Leijten, 2006). One of the earliest attempts in this area of research was made by Bridwell and Duin (1985).

Contrary to other methods of analyzing writing that, for example, chiefly consider aspects of the writing product (e.g., text quality or text complexity), the writer himself/herself (e.g., self-efficacy) or the social context (e.g., collaboration or feedback), keystroke logging mainly highlights the writing process (Graham, 2018). However, it is worth mentioning that keystroke logs do not provide information about why specific writing patterns are employed by the writers (Choi & Dean, 2021). In fact, keystroke logs can be gathered unobtrusively (Barbier & Spinelli-Jullien, 2009; Leijten & Van Waes, 2005) and show text production dynamically (Spelman Miller, Lindgren, & Sullivan, 2008). In addition to the dynamicity of keystroke logs which enhance the chance of studying temporal aspects of writing processes, including pause lengths and locations (e.g., Van Waes & Schellens, 2003), the logs are scalable in nature. This means that keystroke logs can be easily obtained from many writers to scale up studies on the writing process (Lansman, Smith, & Weber, 1993). These two features have made keystroke logs an appropriate means of data collection for studies on writing processes to gain an understanding of the relationship between writing processes and products.

Researchers have used keystroke logs to analyze composition strategies (Xu & Ding, 2014), genre effects (Beauvais, Olive, & Passerault, 2011), and transcription skills (Grabowski, 2008), to name a few. Researchers have also used keystroke logs to compare writing skills between native and nonnative speakers (de Larios, Manchón, Murphy, & Marín, 2008). Writing research in the contexts of spontaneous communication (Chukharev-Hudilainen, 2014), professional writing (Leijten, Van Waes, Schriver, & Hayes, 2014), and language translation (Dragsted & Carl, 2013) and subtitling has also benefited from the availability of keystroke logs. Leijten and Van Waes, (2013) mentioned other aspects of research on writing using keystroke logging include the writing development of children with and without writing difficulties, first vs second/ foreign language writing, comparison of expert and lower-intermediate writers, as well as writing strategies, and cognitive writing process (Leijten & Van Waes, 2013).

However, research on the comparison of writing processes involved in different genres by advanced and lower-intermediate writers is relatively sparse, so conducting such a study can provide empirical and theoretical support for writing curriculum designed for language learning/teaching programs.

With the mentioned background in mind, the current research questions were proposed:

1. Do Iranian lower-intermediate and advanced L2 writers of English differ significantly regarding the word counts in their writing?
2. Do Iranian lower-intermediate and advanced L2 writers of English respond differently to writing tasks regarding pause duration?
3. How does pause behavior interact with the genre of the writing task done by advanced and lower-intermediate EFL writers?

3. METHODOLOGY

3.1. Participants

To meet the aims of the present study, a total of 20 Iranian EFL learners (13 females and 7 males) from Bojnourd, Mashhad, and Tehran cities, Iran, were recruited. All the participants were Iranian students whose first language was Persian and they have had an English learning experience of at least 2 years. The participants included both graduates and students at B.A, M.A., and Ph.D. levels of Teaching English as a Foreign Language, English Literature, or Translation from different Universities in the mentioned cities. Consequently, they had an acceptable level of proficiency with the age range of 22-39 years (mean = 29 years). The participants were selected using convenience sampling from those who took part in the current research based on their willingness to participate. Moreover, the participants were among those who did not avoid writing about the specified topics and their writing tasks included more than 150 words. The learners were then divided into two groups according to their level of proficiency (Advanced and Lower-intermediate) using a placement test. Each group included 10 participants and gender distribution was not a matter of concern.

3.2. Instruments

3.2.1. IELTS Test

A one-timed writing task from an IELTS test was administered to determine the level of proficiency of the learners. It consisted of writing about a general topic in 30 minutes using a minimum of 250 words. The topic was “Some people think that studying history is a waste of time while others think it is essential to learn history. Discuss both views and give your own opinion". In scoring the writing task, the ESL 42 Composition Profile proposed by Jacobs, et al. (1981) was used to rate the texts analytically. Subsequently, all texts were scored analytically by two experienced raters to establish interrater reliability. The interrater reliability using Kappa

statistics was reported as 0. 84. Based on the results of the IELTS test, 10 advance and 10 lower-intermediate learners were identified.

3.2.2. Inputlog

As mentioned, keystroke logging can record pauses occurring in the course of the writing process. In this regard, Inputlog is a keystroke logging tool to unobtrusively monitor writing processes (Leijten & Van Waes, 2013). Basically, Inputlog keeps the record of temporal dimension as well as the activities of the keyboard and mouse while learners are writing. Among different types of logging systems, the latest version of Inputlog 8.0.0.6. was used in the current study due to its efficient functionality and comprehensive output. Due to its versatility, the output file of Inputlog can provide the log file and the descriptive statistics about the writing sessions. A total of 50 log files from 10 students were restored and used in the current study.

3.2.3. Session Identification Questionnaire

Before writing in Inputlog, there is a page in the program that is more like a questionnaire named "session identification". Before recording the participants' writings, they were required to provide their demographic information, including their age and gender, the text language, session name (e.g. the first writing of the current study or question 1 of the study that was often filled by the researcher), their group (related to the participants' level of proficiency as lower-intermediate and advanced), their experience (in language learning or language teaching). Beyond these questions, the researcher asked the participants about their computer keyboard skills.

Figure 1 shows the identification session in the first phase of running the Inputlog.

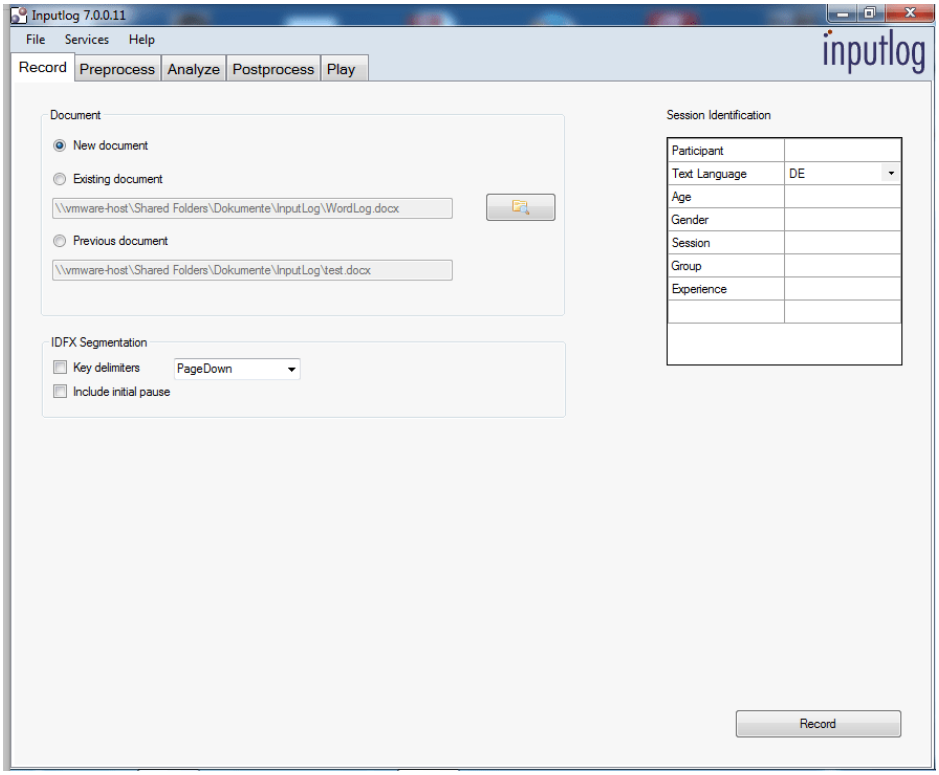

Fig.1:Session Identification in Inputlog 8.0.0.6

The provided information by the participants was included within all files generated from that session, which helped the researcher in later stages to easily identify each writing session.

3.2.4. Writing Task

As the present study aimed to investigate the role of writing genres, the participants were asked to write five texts on five topics each presenting a specific writing genre. The subject area of the topics revolved around a descriptive text describing a process, a personal narrative (my dreams), an argumentative text (a letter to the teacher), a job application, and persuasive text (convincing a reader to accept a view). Each participant was supposed to write about 10 lines (about 150 words) on all the following topics:

Describe the city you are living in.

How would you describe your dream house?

Some people like fast foods while some others reject eating them and consider them unhealthy. Elaborate on the point and specify to which camp you belong.

- A famous company has announced a job vacancy for its public relations office. Write a job application for this job vacancy.
- Do all students need to go to university? Elaborate on the point.

3.3. Procedures

The data collection process took 6 months to complete beginning with conducting the proficiency examination in order to determine the learners' level of writing proficiency. The second phase of data collection involved the process through which participants started writing about five texts in the Inputlog program.

Before doing this task, participants were given a few basic information and instruction about the software. In order to promote the text quality, students were asked to write 15 words for each task in 20 minutes.

Considering the ethical issues, the participants were aware that they were participating in a research study. Moreover, they were assured that their unwillingness to take part in the present study would not affect their final evaluation and assessment. Furthermore, their permission for using the gathered information as research evidence was obtained. Considering confidentiality, the participants did not need to include their names while providing their demographic information.

Using keystroke logging, writing tasks were given to the participants in five sessions. Expert and lower-intermediate learners were compared in five different writing genres, including descriptive, personal narrative, argumentative, and persuasive text, as well as a job application. Data included the pause duration and pause location of the lower-intermediate and skilled L2 writers. Regarding the location of pauses, the researchers in the current study examined pauses as within words (WW), before words (BW), before sentence (BS), and before paragraph (BP).

The raw data (100 writing data taken from 20 lower-intermediate and skilled participants) generated by Inputlog as IDF-files were then converted to SPSS data files for further analysis. Data preparation and analysis were based upon the recommendations outlined in the study conducted by Baaijen, Galbraith, and de Glopper (2012) and also Leijten et al.'s study (2014) on reflections on procedures and measures of keystroke analysis. The keystroke data required for the current study was prepared using the following steps: (1) Activities irrelevant to the actual test task, such as familiarization and entering candidate's information, were removed; (2) All the pause logs were highlighted for further manual analysis; (3) The data files were coded and categorized; (4) All of the data files were converted to SPSS data files for further analysis.

The Inputlog provides a drop-down list that lets the researcher choose the proper action. The choices included General, Linear, Process Graph, Summary, Pause, Source, Revision, S-notation, Token analyzer, Fluency, Bigram, Linguistic. Inputlog generates basic and advanced analyses. A specific analysis was presented for each of these 12 options in XML files separately that could be easily imported to other programs, such as SPSS and Excel. Related to the purpose of the current study, the pause analysis was activated and the output was resented for this case for five writings of each participant in a separate file as within words (WW), before words (BW), before sentence (BS), and before paragraph (BP). So, 100 pause output files were generated and imported to SPSS by Inputlog to be scrutinized. The output file included a basic analysis and an advanced one (check appendix I for a sample pause analysis file belonging to one of five writings of an advanced participant).

To answer the first research question, a two-way ANOVA was run to explore to what extent lower-intermediate and advanced L2 writers of English responded differently to writing the task regarding pause duration. Moreover, the number of pauses in different genres of writing in both groups was compared as it was about the pause behavior interact with the genres.

4. RESULTS

A two-way ANOVA was run to explore to what extent lower-intermediate and advanced L2 writers of English responded differently to writing the task regarding pause duration. As displayed in Table 1, there was not any significant difference between lower-intermediate (M = 5.64) and advanced (M = 5.10) L2 writers' overall pause duration ($F(1, 65) = 1.14$, $p > .05$, $p\eta^2 = .017$)

Table 1: Descriptive Statistics; Overall Pause by Groups

Group	Mean	Std. Error	95% Confidence Interval		F	Sig.	Partial η^2
			Lower Bound	Upper Bound			
Lower-intermediate	5.641	.392	4.858	6.424	1.14	.289	.017
Advanced	5.100	.320	4.461	5.739			

The results also indicated that there were not any significant differences between the lower-intermediate advanced L2 writers' overall means on five genres ($F (1, 65) = .155$, $p > .05$, $p\eta^2 = .009$). The overall means on descriptive (M = 5.48), narrative (M = 5.24), argumentative (M = 5.63), job application (M = 5.05), and persuasive writing (M = 5.42) were fairly close.

Table 2: Descriptive Statistics; Overall Pause by Genre							
Genre	Mean	Std. Error	95% Confidence Interval		F	Sig.	Partial η^2
			Lower Bound	Upper Bound			
Descriptive	5.488	.566	4.357	6.618	.155	.960	.009
Narrative	5.247	.566	4.117	6.378			
Argumentative	5.632	.566	4.502	6.763			
Job Application	5.058	.566	3.928	6.189			
Persuasive	5.427	.566	4.297	6.558			

Table 3 displays the results for the interaction between proficiency levels and genres. The results ($F (1, 65) = 1.24$, $p > .05$, $p\eta^2 = .071$) indicated that there was not any significant interaction between proficiency levels and genre although the results should be interpreted cautiously due to the moderate effect size value of .071. As displayed in Table 3, the lower-intermediate L2 writers had higher means on descriptive and argumentative genres, while the advanced group had higher means on job application and persuasive writing. The two groups had almost the same means of narrative writing.

Table 3: Descriptive Statistics; Overall Pause by Group * Genre					
Group	Genre	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Lower-intermediate	Descriptive	5.925	.877	4.174	7.676
	Narrative	5.260	.877	3.509	7.011
	Argumentative	6.930	.877	5.179	8.681
	Job Application	4.787	.877	3.036	6.538
	Persuasive	5.303	.877	3.552	7.054
Advanced	Descriptive	5.050	.716	3.620	6.480
	Narrative	5.234	.716	3.805	6.664
	Argumentative	4.334	.716	2.905	5.764
	Job Application	5.330	.716	3.900	6.760
	Persuasive	5.551	.716	4.121	6.981
$F (1, 65) = 1.24$, $p = .300$, $p\eta^2 = .071$					

The results of simple-effects analyses (Table 4) indicated that the lower-intermediate group had a significantly higher mean than the advanced group on argumentative writing (MD = 2.59, $p < .05$). There were not any significant differences between the two groups' means on other genres.

Table 4: Pairwise Comparisons Overall Pause by Group * Genre							
Genre	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound

Descriptive	Lower-intermediate	Advanced	.875	1.132	.442	-1.386	3.136
Narrative	Lower-intermediate	Advanced	.026	1.132	.982	-2.235	2.286
Argumentative	Lower-intermediate	Advanced	2.596*	1.132	.025	.335	4.856
Job Application	Advanced	Lower-intermediate	.543	1.132	.633	-1.717	2.804
Persuasive	Advanced	Lower-intermediate	.248	1.132	.827	-2.013	2.508
*. The mean difference is significant at the .05 level.							

A two-way MANOVA was run to compare the lower-intermediate and advanced L2 writers' means on five genres and four types of pauses; i.e. WW, BW, BS, and BP. Table 5 displays the results of two-way MANOVA. The results indicated that there were significant differences between groups on different types of pause location ($F (4, 62) = 9.25$, $p < .05$, $p\eta^2 = .374$); however, types of genre ($F (16, 260) = 903$, $p > .05$, $p\eta^2 = .053$) and the interaction between proficiency levels and types of genre ($F (16, 260) = .632$, $p > .05$, $p\eta^2 = .037$) did not have any significant effects on types of pause duration.

Table 5: Two-Way MANOVA; Types of Pause Location by Group * Genre

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.906	150.243	4.000	62.000	.000	.906
	Wilks' Lambda	.094	150.243	4.000	62.000	.000	.906
	Hotelling's Trace	9.693	150.243	4.000	62.000	.000	.906
	Roy's Largest Root	9.693	150.243	4.000	62.000	.000	.906
Group	Pillai's Trace	.374	9.255	4.000	62.000	.000	.374
	Wilks' Lambda	.626	9.255	4.000	62.000	.000	.374
	Hotelling's Trace	.597	9.255	4.000	62.000	.000	.374
	Roy's Largest Root	.597	9.255	4.000	62.000	.000	.374
Genre	Pillai's Trace	.211	.903	16.000	260.000	.566	.053
	Wilks' Lambda	.801	.897	16.000	190.051	.573	.054
	Hotelling's Trace	.235	.890	16.000	242.000	.581	.056
	Roy's Largest Root	.154	2.504	4.000	65.000	.051	.134
Group * Genre	Pillai's Trace	.150	.632	16.000	260.000	.856	.037
	Wilks' Lambda	.857	.614	16.000	190.051	.870	.038
	Hotelling's Trace	.158	.599	16.000	242.000	.883	.038
	Roy's Largest Root	.082	1.326	4.000	65.000	.270	.075

Table 6 displays the descriptive statistics for the lower-intermediate and advanced L2 writers on five types of genres. The lower-intermediate group had higher means on WW, and BW, while the advanced group had higher means on BS and BP.

Table 6: Descriptive Statistics; Types of Genres by Group

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
PLWW	Lower-intermediate	4.320	.382	3.556	5.083
	Advanced	3.868	.312	3.245	4.491
PLBW	Lower-intermediate	5.070	.356	4.358	5.781
	Advanced	4.200	.291	3.619	4.781
PLBS	Lower-intermediate	9.568	1.255	7.061	12.075
	Advanced	12.008	1.025	9.961	14.055
PLBP	Lower-intermediate	1.327	1.952	-2.571	5.224
	Advanced	13.287	1.593	10.105	16.470

The results of between-subjects effects indicated that none of the F-values were significant; except for the effect of proficiency levels of BP ($F (1, 65) = 22.53$, $p < .05$, $p\eta^2 = .257$). As displayed in Table 6, the advanced L2 writers ($M = 13.28$) had a significantly higher mean than the lower-intermediate ($M = 1.32$) group on BP, especially in the job application and descriptive genres (Table 7).

Table 7: Descriptive Statistics; Types of Pauses by Group * Genre

Types of Pauses	Group	Genre	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
PLWW	Lower-intermediate	Descriptive	5.520	.855	3.813	7.227
		Narrative	4.760	.855	3.053	6.467
		Argumentative	4.268	.855	2.561	5.975
		Job Application	3.862	.855	2.155	5.569
		Persuasive	3.188	.855	1.481	4.895
	Advanced	Descriptive	5.180	.698	3.786	6.574
		Narrative	3.151	.698	1.757	4.545
		Argumentative	2.948	.698	1.554	4.342
		Job Application	4.123	.698	2.730	5.517
		Persuasive	3.938	.698	2.544	5.332
PLBW	Lower-intermediate	Descriptive	5.037	.797	3.446	6.628
		Narrative	4.662	.797	3.071	6.253
		Argumentative	5.937	.797	4.346	7.528
		Job Application	4.435	.797	2.844	6.026
		Persuasive	5.278	.797	3.687	6.869
	Advanced	Descriptive	4.266	.651	2.966	5.565
		Narrative	4.090	.651	2.791	5.389
		Argumentative	3.716	.651	2.416	5.015
		Job Application	4.277	.651	2.978	5.576
		Persuasive	4.650	.651	3.351	5.949
PLBS	Lower-intermediate	Descriptive	11.592	2.807	5.986	17.198
		Narrative	8.285	2.807	2.679	13.891
		Argumentative	12.733	2.807	7.127	18.339
		Job Application	8.910	2.807	3.304	14.516

		Persuasive	6.318	2.807	.712	11.924
	Advanced	Descriptive	10.803	2.292	6.226	15.381
		Narrative	13.116	2.292	8.538	17.693
		Argumentative	11.877	2.292	7.299	16.454
		Job Application	12.379	2.292	7.802	16.956
		Persuasive	11.868	2.292	7.291	16.445
PLBP	Lower-intermediate	Descriptive	.000	4.364	-8.715	8.715
		Narrative	.000	4.364	-8.715	8.715
		Argumentative	1.597	4.364	-7.118	10.312
		Job Application	2.817	4.364	-5.898	11.532
		Persuasive	2.220	4.364	-6.495	10.935
	Advanced	Descriptive	12.086	3.563	4.970	19.201
		Narrative	15.073	3.563	7.957	22.189
		Argumentative	6.527	3.563	-.589	13.643
		Job Application	12.147	3.563	5.031	19.263
		Persuasive	20.604	3.563	13.489	27.720

5. DISCUSSION

Analysis of pauses is one of the preferred methods for accessing the dynamics of writing and is based on the idea that pauses are behavioral correlates of cognitive processes (Chenu, Pellegrino, Jisa, & Fayol, 2014). However, it should be noted that comparing pause frequencies and durations between groups and individuals can be a hazardous task if the writers have very different typing speeds (Wenglin, 2006). Therefore, it is wise to investigate how pauses are distributed within the writing process of a certain individual and compare the relative distributions across individuals or groups (Wenglin, 2006).

With respect to the first purpose of the study which was to investigate pause duration of lower-intermediate and advanced L2 writers of English to writing tasks of different genres, it was found that there was no significant difference between the two groups of writers' overall pause duration. Using Inputlog as a keyword logging system, the researchers did not observe any significant interaction between proficiency levels and genre.

However, the results indicated that there were significant differences between the two groups regarding different types of pause duration although types of genres and the interaction between proficiency levels and types of genres did not have any significant effects on types of pause duration. It was found that the lower-intermediate group had higher means on WW, and BW, while the advanced group had higher means on BS and BP, which was also supported by Phinney and Khouri's (1993) mentioning that lower proficiency writers are more concerned with form over substance tending to pause more word-internally in order to focus on specific forms.

In addition, the advanced group's higher means of pause duration before sentence and paragraph can account for their planning and this is supported by Matsuhashi (1981), who was of the opinion that BS pauses dealt with writing decisions rather than the lack of fluency which can well justify the higher means of these two types of pauses among advanced writers. As Swerts (1998) reported, discourse boundaries between larger units, such as sentences, were more predictive of pauses than smaller units, such as words. Similar results have been found by Wengelin (2001, 2002) indicating that discourse boundaries between larger units were more predictive of pausing than between smaller units, that is pauses are more likely to occur at sentence boundaries than at word boundaries, which are, in turn, more predictive of pausing than locations within words. Moreover, Zesiger, Orliaguet, and Monoud (1994) found that transitions at syllable boundaries were longer than other intra-word transitions and Spelman Miller (2000) found that the pause duration increases as the text unit level increases.

Although studies in the literature have suggested that the higher number of pauses usually show writers' lack of ability to produce chunks of language when writers translate ideas into linguistic forms (Matsuhashi, 1981), the context of this study indicated that pauses should be interpreted cautiously since fluent writers may also show a higher number of pauses, compared to their lower-intermediate counterparts. In fact, the sheer number of pauses does not count for the proficiency of learners, it is rather the pause location which can reveal the EFL learners' level of writing skill.

Regarding the second research question, it was found that the overall means on the descriptive, narrative, argumentative, job application, and persuasive writing were fairly close. This finding was not supported by Beauvais, Olive, and Passerault (2011) claiming that writers tailor their writing behavior to match the genre and quality of the text they are asked to produce. The reason for such a discrepancy can be related to learners' lack of genre awareness as Devitt (2004) emphasized the inclusion of genre awareness in genre-based teachings in order to give the students the understanding of rhetorical determinations and contextual meanings for each genre they encounter. As indicated by previous research, the high demand for integrated tasks leads to lower fluency and longer pauses in most writers' text production, especially those who do not have a good schema for constructing discourse from sources (Severinson Eklundh & Kollberg 2003). In this point of view, genres are

considered as learning strategies that give the learners the chance to gain novel rhetorical knowledge rather than a set of fixed structures. Metacognition and genre awareness can be connected by enhancing consciousness-raising on comprehension and application of genre-based concepts, discourses, and rhetorical aspects used in writing. Therefore, teachers are strongly recommended to enhance EFL learners' genre awareness and assume the significant role of cognition and metacognition in language teaching.

CONCLUSIONS

This study was an attempt to investigate the pause patterns of advanced and lower-intermediate EFL writers while producing texts of different genres. The obtained data were based on the logs generated through the implementation of keystroke logging. This method focuses on process rather than the product which provides a chance for students to self-regulate their writing process (Graham & Harris, 2018; Nicol & MacFarlane-Dick, 2006) by giving the learners insight into their own writing process.

The findings of the present study necessitate the researchers to look into the theoretical ideas behind this micro skill and implement authentic studies to provide further insights into how L2 learners initially develop metacognitive genre awareness and the way this knowledge eventually transfers into the analysis and composition of academic English texts. However, it is important to consider some limitations of the present study when generalizing its results and implications. Firstly, the current study addressed specific aspects of the writing process in terms of pause location and genres, so many other potentially important aspects are still left untouched. Additionally, keystroke logging was the only means of data collection in this study, so non-cognitive aspects of the writing process, such as engagement, were not analyzed. Therefore, researchers who use Keystroke logging can apply other instruments, like eye-trackers, or integrate the product-based method of analyzing writing tasks to enrich their understanding of the perception and production of the writing. Finally, the current study suffers from the samall number of partipants which can be replicated in future with a larger number of students and different genres of writing to broaden the scope of research on the writing process.

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