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The Effect of Task Sequencing on the Writing Fluency of English as Foreign Language Learners

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Abstract
This study investigated the effect of sequencing tasks from simple to complex along +/- reasoning demands on fluency in writing task performance of English as Foreign Language (EFL) learners. The participants of this study included 90 intermediate EFL learners from three intact class divisions at the Islamic Azad University, Shahr-e-Qods Branch. They were distributed in three groups: Experimental A, Experimental B, and a Control group. The students in all groups participated in the writing pre-test. During the eight treatment sessions (in relation to task performance) the first experimental group received a series of picture description tasks in a randomized order of cognitive complexity. The second experimental group received the same tasks, but ordered from simple to complex based on their required reasoning demands. The control group, however, did not receive any picture description tasks; rather they received some typical writing activities. Finally, the post-test was administered to all participants. The results of the data analysis, through Analysis of Variances (ANOVA) using the SPSS software, showed no significant impact for sequencing tasks from simple to complex on fluency in writing task performance.

Keywords: Cognition Hypothesis (CH), Fluency, Task complexity, Triadic Componential Framework (TCF)

INTRODUCTION

During the past thirty years there has been a growing interest on using pedagogic tasks as a means for developingsecond language (L2) performance (Birjandi & Ahangari, 2008; Birjandi & Seifoori, 2009; Ellis, 2000, 2003, 2008; Long, 1989; Long & Crookes, 1992; Maftoon, Birjandi & Pahlavani, 2014; Maftoon & Sharifi Haratmeh, 2012; Nunan, 1989, 1991, 2004; Robinson, 1995a; Shehadeh & Coombe, 2012; Skehan, 1996; Skehan & Foster, 1997; Van den Branden, 2006).

A major concern in relation to task implementation at the curriculum level was, however, developing a set of theoretically sound principles for task sequencing (Romanko & Nakatsugawa, 2010). Robinson (2001a, 2001b, 2005, 2007b, and 2010) proposed a cognitively motivated solution to task sequencing by developing the Cognition Hypothesis (CH). He believed that task sequencing should be done by first having learners perform a simple task (considering the parameters of a task demands) and then gradually increasing their cognitive complexity on subse-

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quent versions. In other words, this hypothesis proposes that pedagogic tasks should be sequenced for learners on the basis of increases in their cognitive complexity so as to increasingly approximate the demands of real-world target tasks. The CH seeks to provide a rationale for sequencing tasks by drawing on the Triadic Componential Framework (TCF) for understanding task demands, broadly grouped into three factors: complexity, conditions, and difficulty; of which Robinson suggested that complexity factors, should be the major basis for pedagogic task sequencing in a task-based syllabus (Robinson, 2001a, 2001b, 2005, 2007b, 2010).

Several empirical studies tested Robinson's hypothesis by investigating the role of task complexity on task-based instruction by using various task-complexity variables such as ± here and now (Gilabert, 2005; Robinson, 1995; Robinson, Ting, & Urwin, 1995), ± reasoning demand (Iwashita, Elder, & McNamara, 2001), and ± few elements (Kuiken, Mos, & Vedder, 2005; Kuiken & Vedder, 2007).

Most of the studies in this area investigated task complexity as one-shot studies by manipulating task complexity along different dimensions and thereby providing the learners with two versions of the same task (simple vs. complex) during a single session. However, there are few studies (e.g. Robinson, 2007b ; Thompson, 2014) exploring the potential effects of manipulating task complexity variables through using simple to complex tasks taking place over a period of time. In response to the need for further research in this area, the current research study was developed to investigate the potential effects of using a chain of simple to complex versions of different tasks of the same type on L2 learners' task performance.

Even though many studies investigated the relationship between task complexity and L2 oral task production, relatively few studies examined the relationship between task complexity and writing task performance (Kuiken & Vedder, 2007; Rahimpour & Hosseini, 2010; Salimi, Dadashpour, & Asadollahfam, 2011). Therefore, this study aimed to investigate the potential effects of manipulating task complexity on L2 learners' writing task performance in terms of fluency. To fulfil the purpose of this study, the following research question was raised:

> *Does manipulating task complexity along the resource-directing dimension of (+/- intentional reasoning demands) have any significant effect on EFL learners' writing task performance in terms of fluency?*

The following null hypothesis was also developed from the research question:

> *Manipulating task complexity along the resource-directing dimension of (+/-intentional reasoning demands) does not have any significant effect on EFL learners' writing task performance in terms of fluency.*

REVIEW OF LITERATURE

Although there are a number of rationales offered for how tasks should be presented to learners (Ellis, 2003; Long and Crooks, 1992; Prabhu, 1987; Skehan, 1996, 2003) based on an increase in their complexity or difficulty, the scope of these two terms and their components need to be further investigated.

By developing the CH and its related TCF, Robinson (1995, 2001a, 2001b, 2005, 2007b, and 2010) sought to provide a universal set of parameters for task sequencing. He distinguished between task complexity and task difficulty, specified their related components, and identified task complexity elements as the basic criteria for task sequencing.

For the present study, the decision was made to sequence tasks according to their cognitive complexity as it was considered to be a reasonable criterion for task organization.

In the following paragraphs, Robinson's distinction between task complexity and task difficulty was discussed and then the Cognition Hypothesis by Robinson (2001a, 2001b), and the Trade-off Hypothesis were explained in details.

Robinson's Distinction between Task Complexity and Task Difficulty

Robinson (2001a) distinguished 'complexity' and 'difficulty' from each other. He believed that differences in the processing demands of tasks are a consequence of task structure and design; however, differences in the resources learners bring to tasks derive from their individual difference in a range of variables.

Robinson (2001b) argued that task complexity is the result of the attentional, memory, reasoning, and other information processing demands imposed by the structure of the task on the language learner" (p. 29). These differences in information processing demands, resulting from design characteristics, are relatively fixed and invariant (Sternberg 1977, as cited in Robinson, 2001b). According to Robinson (2001b) a simple task given to a learner (when giving directions from A to B using a simplified map of a small area with which the speaker is familiar) will always be less demanding than a complex task (when giving directions from A to B and then C using a detailed map of a large area the speaker is unfamiliar with). In fact, task complexity will help explain "within learner variance" in task performance (P. 30). Task complexity factors can be represented by +/- a component , which may be present or absent (they may also be thought of as continua).

Robinson (2001b) distinguished factors contributing to task complexity from learner factors , which may make a task more or less difficult (as opposed to complexity) and are consequence of differences between resources learners draw on in responding to the task demands. He believed that task difficulty factors, are of two types: *affective variables*, such as confidence, motivation, and anxiety, which may temporarily change and so affect the size of resource pool accessibility; and *ability variables*, such as intelligence, aptitude, and cognitive style which are more fixed determinants of resource pools.

Having separated the construct of task complexity from task difficulty, in the next section the researchers will deal with Robinson's Cognition Hypothesis (CH).

Robinson's Cognition Hypothesis (CH)

Robinson (2001a, 2001b, 2003) made a distinction between two dimensions of task complexity, "Resource-directing" dimensions, which direct learner's attention to particular linguistic features of a task, and "Resource-dispersing" dimensions, which deplete learner's attention over the different elements of the tasks (Robinson, 2003, p. 59). An example of a resource-directing dimension is 'reasoning demands' where tasks do not demand reasoning from learners, but just represent a simple transmission of information, require less conceptual and therefore linguistic effort and resources than a task with some reasoning demands, where at least cause-consequence subordination (e.g. because, therefore) is needed. In Robinson's view, increasing cognitive complexity along this type of dimensions may direct attentional and memory resources to task completion and therefore generate more accurate and more complex speech; at the same time, fluency would be negatively affected (Robinson, 2003).

An example of a resource-dispersing variable is access to "planning time" during task performance, as giving no planning time increases the complexity of a task by simply dispersing attentional resources over the different aspects of the task. However, this dimension is also seen as important for syllabus design, as it prepares learners for real-life conditions, so "practice along them could be argued to facilitate real-time access to an already established and also to a developing repertoire of language" (Robinson, 2003, p. 59). Regarding resource-dispersing dimensions, the prediction is made toward a negative effect of an increase in task complexity on all aspects of L2 production; however it will enhance interaction (Robinson, 2003).

Finally, CH predicts that sequencing tasks from simple to complex creates the ideal conditions for practice; therefore, leads to gains in automaticity (DeKeyser, 2000), since it facilitates the administrative processes of scheduling, and coordinating the component demands of complex tasks.

Associated with the CH, Robinson advanced the TCF (2001a, 2007b), which distinguishes

among task complexity factors, task condition factors, and task difficulty factors. In what follows, a schematic perspective of the CH, and its elements organized into categories within the TCF (its first version and an updated version) will be presented (Robinson, 2001a, 2001b; Robinson & Gilabert, 2007).

The Triadic Componential Framework (TCF)

Robinson (2001a) distinguished three groups of factors, which interact to influence task performance, and learning including; "Task Complexity", "Task Difficulty", and "Task Condition". The first group of factors concern "Task Complexity". These are represented as "dimensions, plus or minus a feature, but can also be thought of in some cases as continuum, along which relatively more of a feature is present or absent" (p. 293). These dimensions of complexity, according to him, are "design features of tasks", and they can be manipulated to increase or lessen the cognitive demands of task performance. For example, tasks which require simple description of events happening now, in a shared context (+here and now), where few elements (+few elements) have to be described and distinguished consume less amounts of attentional, memory and reasoning resources than tasks which require reference to events that happened elsewhere (−here and now), in the past, where many elements have to be distinguished (−few elements), and where reasons have to be given to support statements made (+reasoning).

The second group of factors in the TCF includes factors contributing to 'Task Difficulty' (Robinson, 2001a). 'Task Difficulty' can be affected by two different variables: (a) affective variables that can be changed in a relatively short period of time (e.g. motivation, anxiety and confidence), and (b) *ability* factors such as aptitude which could be even measured beforehand (e.g. aptitude, proficiency and intelligence). These are the features learners bring to task performance and normally almost nothing can be done about these before syllabus implementation.

Finally, 'Task Condition' factors concern the nature of the participation required on task (e.g., one-way or two-way information exchange, closed or open task solution), and also participant variables, such as (same or different gender in pairs or groups, or being previously familiar/unfamiliar with each other).

Robinson and Gilabert (2007) believed that gradually approximating target-task demands, by using increasingly complex pedagogic tasks, requires both developing an operational taxonomy for classifying target task features which can be used by task designers, and establishing some principles for sequencing these features, and combinations of them, in an order which approaches target-task demands. According to them the taxonomic system for pedagogic task classification "should include categories of the design features of tasks that can be simulated and sequenced to promote further analysis and development of existing interlanguage knowledge in line with the target L2" (p. 163).To meet these criteria, Robinson and Gilabert (2007) updated the existing version of the TCF by adding some new elements to it. As in the previous version, Robinson and Gilabert (2007) made a distinction between task complexity, task difficulty, and task conditions, and within each category a subdivision was done.

Reasoning Demands as a Variable of Task Complexity

As mentioned previously, Robinson (2001a, 2001b, 2005, 2007a, 2011) categorizes reasoning demands as a part of the resource-directing dimension of task complexity. Getting incites from first language acquisition studies and psychological research, Robinson (2011) identified three aspects of reasoning, including: "spatial, intentional, and causal reasoning" (p. 15). In some studies, researchers attempted to distinguish different types of reasoning demands (spatial reasoning i.e., reasoning about distance and position in physical space; intentional reasoning, i.e., reasoning about motives and intentions of people; and causal reasoning i.e., reasoning about causes and effects of events), however, in other studies no distinction were made due to the fact that the distinction is very delicate, especially between

intentional and causal reasoning.

The claim about 'intentional reasoning' was originated from the research in the field of first language acquisition. Intentional reasoning entails "reasoning about, and successfully understanding (intention-reading) the motives, beliefs and thoughts which cause people to perform actions" (Robinson, 2007a, p. 194), which has been a much studied subject in both developmental and differential cognitive psychology, and in theories of the relationship between language and thought in child development. The ability to represent, conceptualize and reason about psychological, mental states has been called a person's 'theory of mind' (Shatz, Wellman & Silber, 1983) , which frames and interprets perceptions of human behavior in a particular way; as perceptions of agents who can act intentionally and who have feelings, desires and beliefs that guide their actions (Malle 2005, as cited in Robinson, 2007a). Lee and Rescola (2002) found that cognitive state terms (e.g., *think, know*) emerged later in children than physiological (e.g., *sleepy*), emotional (e.g., *happy*), and desire terms (e.g., *want*). They also demonstrated that the use of psychological, cognitive state terms correlated significantly and positively with the use of complex syntax in child development using measures from Scarborough's (1990) Index of Productive Syntax (IPSYN).

In English as a second language, as Robinson (2011) proposed, the same process happens; in other words, tasks which require complex reasoning about the intentional states that motivate others to perform actions can be expected to draw the use of cognitive state terms for reference to other minds. For example; she suspected, wonders, and so on, and thus orient learner attention to the complement constructions accompanying them like; suspected that, wonders whether, hence would promote the use of complex L2 English syntax.

Measuring Fluency in Writing

Measurement considerations should be addressed as an important part of every study of the effect of task complexity on L2 task performance. In this section, issues related to the measurement of the writing task performance in terms of fluency will be addressed.

For oral data, Tavakoli and Skehan (2005) pointed out three possible sub-constructs of fluency: (1) breakdown fluency, which is measured by number or pauses or silences, (2) speed fluency, which is measured by time-related measures, and (3) repair fluency, which is gauged by self-correction measures. For almost any written task, it would be difficult to measure breakdown and repair fluency. Speed fluency, therefore, was the only sub-construct used to measure the writing fluency in this study. Wolfe-Quintero et al. (1998, as cited in Choong, 2013) stated:

> [Fluency in writing] is not a measure of how sophisticated or accurate the words or structures are, but a measure of the sheer number of words or structural units a writer is able to include in their writing within a particular period of time. (p. 106)

Empirical Task Complexity Studies within Written Modality

There have been a number of studies on task complexity within oral modality (e.g. Baralt, 2010; Choong, 2011; Kim, 2009; Lee, 2002; Nuevo, 2006; Révész, 2011; Robinson, 2000, as cited in Robinson, 2005, among others). However, of the small group of empirical studies on cognitive task complexity and writing (Abdollahzadeh & Kashani, 2011; Choong, 2014; Frear, 2014; Kuiken, Mos, & Vedder, 2005; Kuiken & Vedder , 2007, 2008, 2011, 2012, and Rahimpour & Hosseini, 2010), only Abdollahzadeh and Kashani (2011), Rahimpour and Hosseini (2010), and Choong (2014) examined the impact of task complexity on fluency in task performance. In what follows a brief review of each study is provided.

Abdollahzadeh & Kashani (2011) manipulated task complexity along resource-directing dimension of (+/-here and now). The findings of their study indicated significant positive impact for task complexity on complexity and accuracy in writing performance. However, no significant ef-

fect for task complexity on fluency was reported.

Rahimpour and Hosseini (2010) investigated the impact of task complexity manipulation along resource-directing dimension of +/-here-and-now on L2 learners' written narratives. 52 Iranian English learners were selected as the participants of the study. They were asked to write two narratives based on two different picture stories. First, they performed the here-and-now task (present tense and context-supported) and then, they performed the there-and-then task (past tense and context-unsupported). Next, the written narratives were coded to measure the accuracy, fluency, and complexity. The results of the study demonstrated that cognitively more demanding tasks were more fluent.

Choong (2014) , in his study, examined the relationship between causal reasoning demands of tasks and the complexity, accuracy, and fluency aspects of written production of L2 learners. He used a video-retelling task, which was a video-clip from a television show, in which, a character when preparing for a date, notices a wrinkle in his pants and it leads to a chain of events. The task included four prompts that differed in the amount of causal reasoning required to interpret the events in the video, thus creating four different conditions. Causal reasoning was manipulated in terms of directness, intentionality, and agency to create conditions of no, low, moderate, and high causal reasoning demands. The study did not show any task effects for the fluency of written production; in fact, fluency did not seem to vary due to task conditions in the study. Choong (2014) believed that this may be due to the written mode employed in his study, as most studies of task effects for fluency were performed in the oral mode, possibly allowing for more sensitive measures.

METHODS

Participants

There were 90 male and female students from three intact class divisions At The Islamic Azad University, Shahr-e-Qods Branch, were invited to participate in this study. Their ages ranged between 20-32 years. They were recruited from a larger group of 120 learners based on their performance on Preliminary English Test (PET). Students who scored within the range of one standard deviation below and above the mean in the PET test were selected for the purpose of the study. They were undergraduate students in the field of English language translation. During the study they were taking two-credit essay writing course. They were expected to have studied English for 7 years in junior and senior high school levels before entering university. The sample was assumed to represent the larger population of Iranian university students, for they were from different provinces of Iran and factors such as age and gender were randomly distributed. During the course, all the students studied the same text book 'The practical writer' by Bailey and Powell (2008).

Instruments

To obtain the required data for this study, the following instruments were employed:

Preliminary English Test (PET)

PET (Preliminary English Test, 2015); taken from the website http://www.cambridgeenglish.org/exams/preliminary/exam-format, is made up of three papers developed to test the participants' English skills. It consists of three sections: reading and writing, listening, and speaking. For the purpose of this study just reading, writing and listening part were administered.

Pre-test and post-test

A cartoon picture description task adopted from Abdollahzadeh and Kashani (2011) was used as both the pre-test and post-test. The task required participants to write a story based on a set of nine cartoon pictures. The selected picture story, although clearly structured with a chronologically ordered series of events, required interpretation on the part of the learners because the character's motive for performing different actions is uncertain until the final picture.

Picture Arrangement (PA) subtest of Wechsler Adult Intelligence Scale, Revised version (WAIS-R)

The Wechsler Adult Intelligence Scale (WAIS) is an intelligence test designed to measure cognitive ability in adults and older adolescents. The original WAIS was published in Wechsler (1955, as cited in https://www.wechsleradultintelligence scale.com/). It is currently in its fourth edition (WAIS-IV) released in 2008, and is the most widely used IQ test for both adults and older adolescents in the world. The WAIS-R, a revised form of the WAIS, was released in 1981 and consisted of six verbal and five performance subtests. For the purpose of this study the Picture Arrangement (PA) subtest of WAIS-R was used to operationalize intentional reasoning demands. It consists of sets of pictures progressively increasing in the demands they make on the ability to reason about characters motives for, and intentions in, performing actions.

Procedure

To address the research questions the following steps were taken in the current study. For the purpose of homogenizing the participants, a sample of PET was used to ensure that the participants were from almost the same general proficiency level. After the main administration of the test, the participants were given a score based on their performance and those participants whose scores were within the range of one standard deviation above and below the mean were chosen to participate in the study. The selected participants were distributed in three groups: Experimental A, Experimental B, and a Control group; each consists of 30 students. During the first session, the students in all groups took part in the pre-test. A cartoon picture description task adopted from Abdollahzadeh and Kashani (2011) was used as the pre-test. The participants were required to write a narrative account for the cartoon picture in thirty minutes. From the second session, the treatment sessions including 8 sessions of picture description task performance began, during which the first experimental group (Experimental A) received a series of 8 picture description tasks in a randomized order of cognitive complexity; each in one session. The second experimental group (Experimental B) received the same tasks, but this time the tasks were ordered from simple to complex based on their required reasoning demands; in other words the simplest task were administered in the first session and the most complex one was administered in the last session of the treatment. The control group, on the other hand, did not receive any picture description tasks; rather they received some typical writing activities and performed extra writing tasks from the course book. In fact, during the first forty five minutes of every session students in all groups received the writing lesson from the book based on a pre-specified syllabus, and write a paragraph or an essay about an agreed upon topic. They were supposed to revise their pieces of writing and give them to the instructor as their assignment for the next session. Two of the students were required to copy their papers for the whole class to be corrected by the other students and the instructor during the next session. The treatment tasks were administered to the participants in the experimental groups during the second forty five minutes of the session time. During the second half of the class time, first linguistic input, in the form of phrases that would be helpful, but not essential, for completing the tasks, were provided to the students along with the set of pictures for each task. Next, the students were given 30 minutes to perform the task during which they were allowed to use a Persian to English dictionary. After that the correct arrangement of the pictures was provided to the learners along with a clear description of the story; therefore, the students became aware of their errors, and ask and answer questions regarding grammatical points and word choice. The questions were answered by either the other students or the instructor. Finally, during the last session the post- test which was the same as the pre-test was administered to the participants.

The Treatment Tasks

Most of the previous studies related to task com-

plexity and writing had been cross-sectional studies that only required students' participation at one point in time. However, in this study the treatment tasks were sequenced to increase in complexity according to the claims of Robinson's (2003) CH. This involved sequencing the tasks so they increased in complexity along the resource-directing dimensions by increasing the intentional reasoning demands of the tasks.

Getting insights from Robinson (2000, as cited in Robinson, 2005) reasoning demands was operationalized by using a series of one-way, closed picture arrangement tasks. The participants were asked to view a randomly ordered series of pictures showing characters performing different actions, and decide which chronological sequence they should be arranged into in order to depict a coherent story. Then they were supposed to provide a written description of the story that the series of pictures described (i.e., in the chronological order they had chosen). Reasoning demand was differentiated by using a set of least to most complex picture sequences from the PA subtest of the WAIS-R. PA consists of ten tasks; the last eight of which were administered during the eight sessions of treatment.

In the PA subtest, sets of pictures progressively increase in the demands they make on the ability to reason about characters motives for, and intentions in, performing actions. The simplest sequence consists of three pictures depicting three stages, or successive actions, in the construction of a house, with no reasoning about the motives, intentions or other thoughts of people. However, in the most complex version, pictures can only be successfully sequenced if motives, intentions and thoughts can be inferred. Based on Robinson's description of different types of reasoning; the tasks were designed to measure intentional reasoning.

Data Coding

Speed fluency was measured by the number of words per minute produced by the participants, using the following formula (Wolfe-Quintero et al., 1998 as cited in Choong, 2014):

$$\frac{\#\ of\ words}{\#\ of\ minutes}$$

DATA ANALYSIS

In order to answer the research question and to verify the null hypothesis, first the quality of the numerical data was analyzed with one-sample Kolmogorov-Smirnov tests of normality. Later, reliability of the estimates of fluency was investigated and homogeneity of the samples in terms of their members' language proficiency and writing ability was evaluated. After normality and reliability of the data were examined and homogeneity of the samples was investigated, the data was put to a set of statistical analyses so that the researcher was able to verify the null hypotheses. The null hypothesis focused on the effect of the treatments provided in the three samples on EFL learners' writing fluency; therefore, the effect of the treatment provided in each of the groups on the subjects' writing fluency was examined individually. Then, significance of the difference between the impacts of the treatments in the three groups was put to statistical tests. Tables 1 through 6 provide the results of the Wilcoxon signed rank test of the pretest and posttest of writing fluency in the three samples.

Table 1

Wilcoxon signed rank test of the pretest and posttest of writing fluency of the first experimental group

Total N	30
Test Statistic	294.000
Standard Error	46.241
Standardized Test Statistic	1.665
Asymptotic Sig.(2-sided test)	.096

Table 2
Wilcoxon signed rank hypothesis test of writing fluency of the first experimental group

Hypothesis Test Summary

	Null hypothesis	Test	Sig.	Decision
1	The median of differences between the pretest of writing fluency of the 1st experimental group and the posttest of writing fluency of the 1st experimental group equals 0.	Related-Samples Wilcoxon Signed Rank Test	.096	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

The asymptotic level of significance of the difference between the first experimental group members' writing fluency scores in the pretest and the posttest (p = .096), reported in Tables 1 and 2, was larger than the standard (α = .05); therefore, it was concluded that the improvement observed in the first experimental group was not statistically significant.

Table 3
Wilcoxon signed rank test of the pretest and posttest of writing fluency of the second experimental group

Total N	30
Test Statistic	139.000
Standard Error	46.202
Standardized Test Statistic	-1.699
Asymptotic Sig.(2-sided test)	.089

Table 4
Wilcoxon signed rank hypothesis test of writing fluency of the second experimental group

Hypothesis Test Summary

	Null hypothesis	Test	Sig.	Decision
1	The median of differences between the pretest of writing fluency of the 2nd experimental group and the posttest of writing fluency of the 2nd experimental group equals 0.	Related-Samples Wilcoxon Signed Rank Test	.089	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Tables 3 and 4, which are dedicated to the Wilcoxon signed rank test of the pre-test and post-test of writing fluency of the second experimental group proved the same result. In fact, there was no statistically significant difference between the second experimental group members' performance in the pretest and posttest of writing in terms of writing fluency. This was due to the fact that, just like the case with the other experimental group, the estimated level of significance, which was (p =.089), was larger than the (α =.05) standard level.

Unlike the two experimental groups, the control group members who were not provided with any picture description tasks improved significantly. The asymptotic level of significance reported in Tables 6 and 7 (p = .004) was smaller than the standard (α = .05). Consequently, it was concluded that the members of the control group had improved their writing fluency during the study.

Table 5
Wilcoxon signed rank test of the pretest and posttest of writing fluency of the control group

Total N	30
Test Statistic	351.000
Standard Error	46.239
Standardized Test Statistic	2.887
Asymptotic Sig.(2-sided test)	.004

Table 6
Wilcoxon signed rank hypothesis test of writing fluency of the control group

Hypothesis Test Summary				
	Null hypothesis	**Test**	**Sig.**	**Decision**
1	The median of differences between the pretest of writing fluency of the control group and the posttest of writing fluency of the control group equals 0.	Related-Samples Wilcoxon Signed Rank Test	.004	Reject the null hypothesis.
Asymptotic significances are displayed.		The significance level is .05.		

After investigating the effect of the treatments given in the samples individually, two independent samples Kruskal-Wallis tests were employed in order to make it possible to compare the effect of the treatments in the three groups simultaneously. Tables 7, 8 and 9 and Figures 1 and 2 summarized the findings of this statistical test.

The level of significance of the difference between the results of the pre-test of writing fluency of the three groups reported in Tables 8 and 10 (i.e. p = .583) and that of the posttest reported in Tables 9 and 10 (i.e. p = .391) both pointed to the fact that performance of the members of the three groups in the pretest and the posttest of writing fluency was not statistically different from each other. This is visually depicted in Figures 1 and 2.

Table7
Independent-samples Kruskal-Wallis test of the pre-test of writing fluency of the three groups

Total N	90
Test Statistic	1.080
Degrees of Freedom	2
Asymptotic Sig. (2-sided test)	.583
The test statistic is adjusted for ties.	

Table 8
Independent-samples Kruskal-Wallis test of the post-test of writing fluency of the three groups

Total N	90
Test Statistic	1.878
Degrees of Freedom	2
Asymptotic Sig. (2-sided test)	.391
The test statistic is adjusted for ties.	

Table 9
Independent-samples Kruskal-Wallis hypothesis test of the three groups

Hypothesis Test Summary				
	Null hypothesis	**Test**	**Sig.**	**Decision**
1	The distribution of the pretest of writing fluency is the same across categories of group membership.	Independent-Samples Kruskal-Wallis Test	.583	Retain the null hypothesis.
2	The distribution of the posttest of writing fluency is the same across categories of group membership.	Independent-Samples Kruskal-Wallis Test	.391	Retain the null hypothesis.

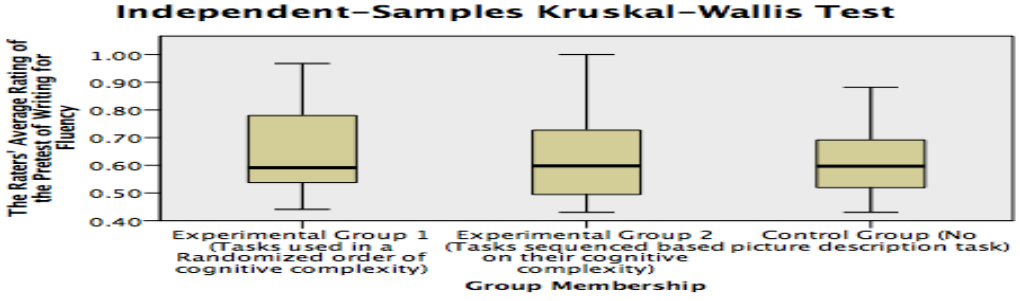

Figure1. **Independent-samples Kruskal-Wallis test of differences between the pretest of writing fluency in the three groups**

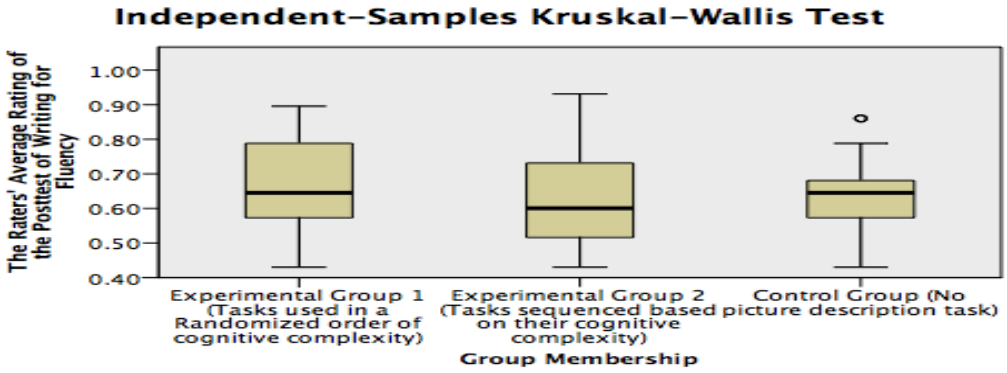

Figure2. **Independent-samples Kruskal-Wallis test of differences between the posttest of writing fluency in the three groups**

RESULTS AND DISCUSSIONS

Based on the results presented in Tables 1,2,3,4, and 5 the null hypothesis could not be rejected. The asymptotic level of significance of the difference between the first experimental group members' writing fluency scores in the pretest and the posttest (p = .096), reported in Tables 2 and 3, was larger than the standard (α = .05); therefore, it was concluded that the improvement observed in the first experimental group was not statistically significant. Similarly, Tables 4 and 5 proved that, there was no statistically significant difference between the second experimental group members' performance in the pretest and posttest of writing in terms of writing fluency; in fact, the estimated level of significance, was (p = .096), was larger than the standard level (α = .05). However, based on the results reported in Tables 6 and 7, unlike the two experimental groups, the control group members who were not provided with any picture description tasks improved significantly in their writing fluency. The improvement observed in the writing fluency of the students in the control group might be due to many reasons some of which include:

1. The negative effect of the treatments provided in the experimental groups on writing fluency
2. Activation of negatively functioning moderator variables by the treatments provided in the experimental groups.
3. The vast possibility of improvement in the control group (i.e. large margin of improvement) because of the fact that they were weaker than the members of the experimental groups (Those who are weaker in the pretest can improve their scores much more in the posttest).

Based on the results of this study, the null hypothesis was not rejected, since sequencing tasks from simple to complex along +/- intentional reasoning demands was shown to have no significant impact on EFL learners' writing task performance in terms of fluency.

In this section, first the compatibility of the results of the study with Robinson's Cognition Hypothesis (2001a, 2001b, 2003) will be examined, and then the results of the study will be compared to and contrasted against some previous related studies.

According to Robinson (2003) manipulating task complexity along resource-directing dimensions (e.g. the amount of reasoning) may direct attentional and memory resources to task completion and therefore generate more accurate and more complex speech; at the same time, fluency would be negatively affected (Robinson, 2003). Therefore, the results of this study neither confirm, nor reject the cognition hypothesis, since no significant positive or negative effect for the treatment on fluency in the two experimental groups was reported by the findings.

There are some studies, which have investigated the effect of manipulating task complexity along different resource-directing dimensions on different aspects of writing performance (Choong, 2014; Frear, 2014; Ishikawa, 2006; Kuiken & Vedder, 2007; Rahimpour & Hosseini, 2010).

The findings of this study are in contrast with those of Ishikawa (2006) who found that increasing task complexity with respect to resource-directing dimension of (+/-here and now) increased the fluency of written language production. The results are also in contrast with the findings of Rahimpour and Hosseini (2010) who investigated the impact of task complexity along the resource directing dimensions of (+/-here-and-now and +/-contextual support) and demonstrated positive effect for fluency.

Among these studies, which (2014) manipulated task complexity along the same resource directing dimension as this study (i.e. reasoning demands). However, it has to be mentioned that none of these studies manipulated task complexity along a period of time; in fact, they manipulated task complexity in one-shot studies by providing the learners with two or more versions of the same task (with different degrees of complexity) during a single session. Except for this research there has been paucity of research directed specifically at the effect of a cycle of simple to complex versions of a task taking place over a longer period of time (e.g. Robinson, 2007a; Thompson, 2014); nevertheless, it is worth mentioning that both of these studies have been conducted in the oral mode of performance. In what follows, the results of this study will be compared with previous studies which have been closer to this study.

The results of this study confirm Abdollahzadeh and Kashani's study (2011) who manipulated task complexity along resource-directing dimension of (+/-here and now); in that they reported no significant effect for task complexity on fluency.

Among those studies which manipulated task complexity along the reasoning demands dimensions the results of this study are only in line with the findings of Choong's (2014) study who examined the impact of task complexity manipulation along causal reasoning demands on complexity, accuracy, and fluency aspects of written production and reported no significant effect on fluency. Choong (2014) believed that this may be due to the written mode employed in his study, as most studies of task effects for fluency were performed in the oral mode, and possibly allowed for more sensitive measures.

According to Frear (2014) the contrasting patterns of the findings might be related to the research design of these studies (i.e., different types of tasks used) and to the fact that different L2s and learners with different levels of proficiency were investigated.

Pedagogical Implications

This study sought to explore the effects of task complexity manipulation along the resource-directing dimension of intentional reasoning demands on L2 English learners writing task performance in terms of fluency. The results of this study may have several theoretical, methodological, and pedagogical implications.

Due to the fact, that one of the significant problems regarding the implementation of tasks in SLA has been developing a set of sound principles for task sequencing (Romanko & Nakatsugawa, 2010), Robinson's (2001a, 2005, 2007, and 2010) CH and its related TCF can be proposed as a useful tool for pedagogical and research purposes in the area of SLA. Since it provides a framework greatly supported by theory, it can help researchers to design an experiment related to task complexity, and justify their findings with a theoretical basis. Furthermore, by providing a clear categorization of the variables related to task complexity, task difficulty, and task condition, the model prevents possible confusions which might occur in putting the theory into practice.

This study can also be applied in form-focused tasks. Different linguistic forms can be

targeted and practiced using this procedure. However, with regards to matching tasks and language production there is not a direct, one-to-one relationship between language functions and linguistic forms (Choong, 2013). For example, there are many ways to express causality in English and many different methods may be employed by the participants; hence, it may be difficult to make predictions about language production according to task complexity. This may necessitate inquiry and examination by TBLT researchers regarding which task complexity dimensions, language forms and functions have strong relationships, and which may not (Choong, 2013).

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