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Original Research

The Power of Executing Preceding Cognitively Simple Listening Tasks in the Quality of the High-Complex Task: Synchronous Probe into ± Spatial Reasoning Demand and ± Single Task Dimensions

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Abstract

The key to the success of tasks in promoting L2 is adopting a proper ordering of tasks. This research was done in pursuit of achieving two goals by utilizing Robinson's (2010) SSARC (stabilize, simplify, automatize, reconstruct, and complexify) model. The first goal included probing the power of executing the non-complex without spatial reasoning and single listening task and the complex without spatial reasoning and dual listening task ahead of the high-complex spatial reasoning and dual listening task in executing the high-complex spatial reasoning and dual task. Probing the agreement between hypothetically defined task complexity and students' thoughts on task difficulty was the second goal. To achieve its goals, this research adopted the relative comparison group and correlational designs. Participants of this research were thirty-two female undergraduate students from a non-profit university in Tehran. They were put into high-proficiency groups based on how they did the Oxford Placement Test. Participants of group one executed the high-complex task as the last task in non-complex, complex, and high-complex order and then gave their view of the difficulty level of tasks, while group two participants executed the same task as the first one. The results of the independent samples t-test, one sample t-test, and Spearman's rho correlation disapproved the statistically significant power of executing preceding lower-complexity tasks in participants' performance on the high-complex listening comprehension task and the agreement between the way participants think of task difficulty and task complexity has been defined theoretically. Accordingly, executing non-complex and complex listening tasks ahead of the high-complex listening task is not an instrumental means for forwarding how to execute the high-complex tasks and participants' view of task difficulty cannot be a proper benchmark for determining the cognitive complexity of tasks. What was found by this research is instrumental to the selection and ordering of tasks for L2 classes and learners.

Keywords: Dual Task, Spatial Reasoning Task, SSARC Model, Task Difficulty, Task Executing Order

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1. Introduction

Stressing meaning, developers of the task-based syllabus devised it as an appropriate substitution for the linguistic-based syllabus where the linguistic form is at the center of attention (Ellis, 2003; Robinson, 2005). Tasks create an opportunity for learners to appropriately use language in context, not merely to display it. Tasks make use of communicating to achieve success in developing L2 proficiency. Tasks employed to teach language are extremely instrumental in establishing a more communicative approach to teaching (Ellis, 2003). The instrumentality of a task-based syllabus partially depends on the benchmarks it uses to lay the foundation of ordering tasks, as inappropriate ordering does not lead to L2 development. Different proposals have been put forward for ordering tasks (Robinson, 2005; Skehan, 1998). Robinson (2005) as a leading figure in this field proposes that how pedagogical tasks are developed and sequenced should crescively bridge the gap between the demands placed on learners by pedagogical and real-world tasks. The need to sequence and grade instructional tasks led to the advent of task complexity. It is a controversial decision to consider some benchmarks and exclude others during ordering tasks. A task-based syllabus uses both the cognitive demands as well as linguistic demands of tasks and learners' development level as benchmarks to sequence a task, they should agree with each other. Accordingly, working on the power of tasks in teaching L2 is a multifaceted phenomenon. Researchers need to resolve these questions: Which features of tasks are considered more significant compared to others to determine whether a task should be performed as the first one or the last one? Which dimensions of task complexity should be worked on? In what order tasks should be received by learners to promote their L2 development? Can learners' view of task difficulty be a reliable benchmark for determining how complex a task is? Which skills should be worked on? Speaking, writing, reading, or listening skill?

This research delved into ± spatial reasoning and ± dual task dimensions of task complexity. The worth of delving into these dimensions is down to the fact that they are indispensable parts of successful performance in many fields, including engineering, geometry, physics, geography, and so on. Spatial reasoning and multitasking abilities are also requisite of everyday activities, including driving, giving directions, and arranging room furniture. Further, the lack of studies on the consequence of executing the high-complex listening comprehension task with preceding lower-complexity tasks manipulated on these two dimensions based on Robinson's (2010) SSARC model reveals the worth of delving into these two dimensions. The power of executing non-complex and complex tasks in executing the high-complex task was delved into. This investigation is worth pursuing, as one of the valuable issues in task-based language teaching is finding factors that are more instrumental in executing tasks. L2 teachers should know from among the level of cognitive complexity of tasks, the order of executing tasks, and learners' proficiency level which one is more instrumental.

Participants' thoughts on the difficulty level of the task and Robinson's definition of task complexity were juxtaposed to test whether the high-complex task is very difficult in participants' view as it is defined in Robinson's SSARC model. The worthy place of bringing forth benchmarks for the complexity level of tasks in the instrumentality of tasks to L2 development demonstrates the worth of this juxtaposition. The linguistic mode of this research was listening comprehension. The worth of delving into the listening comprehension skill in addition to its importance as a main skill of L2 is down to its power to improve the speaking skill.

2. Literature Review

2.1. Robinson's Cognition Hypothesis

Scholars (Ellis, 2003; Long, 2015; Nunan, 2004; Skehan, 1996) believe that task-based language teaching has been invented to create opportunities that are instrumental in executing real-world target tasks by L2 learners. Robinson's (2001a, 2001b, 2005, 2007) cognition hypothesis delineates the presence of a direct relationship between task-based language teaching and cognitive processes which are essential to second language performance and improvement. It suggests that the ordering of tasks should take place just based on their cognitive complexity. Taking steps toward implementing cognition hypothesis suggestions and ordering tasks, Robinson created the Triadic Componential Framework (TCF). Such a Triadic Componential model is an imitation of real-world tasks that possess several constituents (Robinson, 2003).

2.2. Robinson's Triadic Componential Framework

Task-based language teaching researchers (Skehan, 1998; Skehan & Foster, 2001; Robinson, 2001a) focused on determining the degree of complexity or simplicity of tasks as a tool to sequence tasks. Robinson (2001a) created the TCF whose building blocks are task complexity, task difficulty, and task condition with their constituents to determine the complexity level of tasks. He claimed that the way TCF constituents have been manipulated is the determinant of the complexity of a task.

Task complexity, the first building block of TCF, deals with the nature of task structures and designs. The degree of attention, memory, reasoning, and other information processing abilities that executing a task demands of learners can be changed by task structures and designs and it indicates whether a task is complex or not. Accordingly, task designers can make a change to its structure to make it more or less complex. Contrary to simple tasks, the processing demands of complex tasks are higher (Robinson, 2001a). The birth of task complexity dates back to when scholars wanted to identify specific benchmarks for organized task ordering (arranging tasks from easy to difficult) which will lead to learners' interlanguage development in a task-based syllabus (Gilabert, 2007b). Variables of task complexity have been distinguished by assigning them to two different dimensions, resource-directing and dispersing dimensions. Variables assigned to resource-directing dimensions are shown as below: ± few elements, ± here-and-now, ± causal reasoning, ± spatial reasoning, ± intentional reasoning, and ± perspective taking; variables ± planning time, ± single task, ± prior knowledge, ± few steps, ± task structure, and ± independency of steps belong to resource-dispersing dimensions.

Resource-directing and dispersing dimensions vary because of adopting various means for indicating the level of complexity of tasks, meaning they adopt distinct benchmarks for identifying the demands of a variable on task performers' attentional and memory resources. The former concentrates on altering aspects of the linguistic system, while the latter concentrates on altering the procedures of executing tasks. To put it differently, resource-directing variables are cognitively or conceptually demanding, but resource-dispersing variables are procedurally/performatively demanding. Linguistic and conceptual demands of tasks can be satisfied by pertinent linguistic systems. The connection between heightening task complexity on resource-directing dimensions and language production is distinct from the connection between heightening task complexity on resource-dispersing dimensions and language production. Complex tasks from resource-directing dimensions can promote learners' linguistic performance by directing their language resources to specific language forms and structures. Meanwhile, complex resource-dispersing tasks degrade learners' linguistic performance (Robinson, 2008).

Task difficulty, the second building block of TCF, deals with the view learners hold on task difficulty and its variables are divided into two sets, ability and affective variables. Ability variables, including intelligence, language aptitude, and memory capacity indicate how skillful learners are at executing tasks; and affective variables, including motivation, confidence, and anxiety indicate learners' feelings (Robinson, 2001b).

Task condition, the third building block of TCF, serves as the heading of participation and participant variables. According to participation variables, a distinction should be made between tasks based on engaging learners in interaction with other learners in a classroom or not engaging them (one-way vs two-way tasks), or based on concentrating on accomplishing the same or different goals (convergent vs divergent tasks); participant variables concentrate on the bases employed to designate participants of a group (the gender of learners in a group, and their familiarity) (Malicka, 2014).

Robinson made his primary TCF more comprehensive in 2007. His more comprehensive form of TCF and primary model have common building blocks, task complexity, difficulty, and condition, but containing classification benchmarks and procedure as well as several additional subcomponents distinguishes the comprehensive form from the primary model (Robinson, 2007).

2.3. SSARC Model

Robinson (2010) established the SSARC model to explain that ordering pedagogical tasks can be a three-step process and it is driven by two grading principles. Based on principle one the focal point of ordering tasks should be just being cognitively demanding. Principle two refers to commencing the process of intensifying the degree of complexity of tasks along resource-dispersing dimensions that antecedes intensifying the degree of complexity of tasks along resource-directing dimensions. SSARC is the abbreviation of five conditions of learners' interlanguage system during executing tasks which appear synchronically with three steps. What is essential to executing resource-directing and dispersing simple tasks in step one is the "simple and stable"(SS) condition of learners' present interlanguage system; the increment of "automatization" (A) is possible by executing resource-directing simple and resource-dispersing complex tasks in step two; the increment of "restructuring"(R), being able to develop new form-function mappings, and the highest level of "complexity"(C) which is the means of destabilizing interlanguage system are possible by executing resource-directing and dispersing complex tasks in step three.

2.4. Spatial Reasoning

What indicates being equipped with spatial reasoning ability, a task complexity variable, involves the successful comprehension and explanation of where objects exist, the direction of objects, and the position of objects relative to the other ones. Achieving this ability can be reflected in successfully using spatial concepts such as left, right, straight, up, down, front, and back. Gilabert (2007 a) and Gilabert et al. (2009) worked on one of the ways of comparing the outcome of executing simple spatial reasoning tasks with that of executing complex spatial reasoning tasks. They achieved this aim by working on two versions of instruction giving map tasks, simple and complex versions. In opposite to simple map tasks that can be executed just by mastering left, right, and straight, complex map tasks place greater conceptual demands on learners and they can be executed by mastering left, right, straight, up, down, front, and back.

2.5. Empirical Studies on Ordering Tasks and Task Difficulty

Allaw and McDonough (2019) did research to find whether the quality of learners' written performance is traceable to ordering tasks or is an irrelevant factor. They achieved their ends by presenting writing tasks to participants in two ways, non-complex-to-complex order and complex-to-non-complex. Containing more spatial reasoning with task structure or less spatial reasoning without task structure differentiated non-complex and complex tasks. Researchers found that adopting different approaches to ordering tasks is not an instrumental factor in writing a task that is lexically diverse and fluent and has grammatically accurate relative clauses. Their research just approved the instrumentality of executing tasks in non-complex-to-complex order to long-term gains.

Zare-ee (2013) did research to find the connection between hypothetically defined task complexity and participants' view of listening task difficulty. Containing here-and-now events or there-and-then events, presenting prior knowledge or not presenting it to participants, listening to the task thoroughly or just to some of its part, listening to the first-person point of view or third-person point of view task differentiated non-complex and complex tasks. His research results approved the disagreement between hypothetically defined task complexity and participants' view of the difficulty of most tasks. Just the there-and-then complex task was difficult for participants.

Lee (2021) carried out a study on how the quality of L2 writing changes by making a change to the sequence of executing tasks and their complexity. Changing the number of elements of tasks was used as a means to change the degree of complexity of tasks. The number of elements of high-complex tasks (arranging seating 8 people) was higher than that of the complex task (arranging seating 6 people) and the number of elements of the complex task was more than that of the non-complex task (arranging seating 4 people). One group of participants initiated executing tasks with the non-complex task and executed the complex and high-complex tasks subsequently while another group initiated with the high-complex task and executed the complex and non-complex tasks subsequently. She observed that the quality of participants' writing changes with changing the execution order of tasks. Syntactically complex writing was the result of executing the complex task with the preceding non-complex task and lexically diverse writing was the result of executing the non-complex task with preceding more complex tasks.

Tabari and Cho (2022) attempted to find whether the quality of learners' written performance is traceable to ordering tasks or is an irrelevant factor. They achieved their ends by presenting decision-making writing tasks to participants in three ways, simple-to-complex sequence, complex-to-simple sequence, and separately. Producing more syntactically complex and accurate written language by the simple-to-complex group emanated from the efficiency of executing lower-complexity tasks ahead of complex ones. The simple-to-complex group was more successful than the complex-to-simple group in gradually improving all domains of their written output, accuracy, fluency, syntactic and lexical complexity, and both groups were more successful than participants who carried out simple, complex, and more complex tasks separately.

Santos (2022) found the power of ordering in oral production by juxtaposing participants' performance on non-complex and complex tasks executed in sequence with their performance on individualized non-complex or complex tasks. Requiring a higher degree of reasoning (complex task) or a lower degree (non-complex task) differentiated non-complex and complex tasks. ordering tasks had an influential power in producing accurate language.

Malicka (2018) studied the way participants' speech fluency, accuracy, and complexity related to the sequence in which they execute oral tasks. To achieve this end, she asked one group of participants to execute non-complex, complex, and high-complex tasks sequentially and asked another group of participants to execute just one of the non-complex, complex, or high-complex tasks. The number of mental operations was used to operationalize the variable of the number of elements and reasoning demands. The non-complex task without any mental operation was executed just by transmitting information, the mental operations of apologizing, describing, and recommending were common among complex and high-complex tasks. The mental operation of giving a reason for a choice distinguished the complex task from the high-complex one. Three areas of participants' oral production that were under the positive influence of ordering tasks involved speech rate, accuracy, and structural complexity; just the fluency of their speech was under the negative influence of task order.

Awwad (2019) carried out a study with the purpose of finding the power of task complexity in participants' view of task difficulty. The degree of need of each task for intentional reasoning determined their simplicity or complexity. Contrary to the complex task, the simple task was needless of intentional reasoning. His study results confirmed the agreement between task complexity and participants' view of task difficulty. To put it differently, the complex task was difficult in the participants' opinion.

Sanajou et al. (2017) did a study to find whether the complexity of a task contributes to learners' view of task difficulty. The basis for dividing tasks into simple and complex ones was their numbers. The simple and complex tasks were single and dual respectively. Putting pictures in the correct order in addition to writing a story based on those pictures was the second task that had to be done by the dual task group. The findings of their study approved the presence of a linkage between task complexity and participants' view of task difficulty.

2.6. Purpose of the Study

The current research was done in the pursuit of two goals. Firstly, it aimed to see the power of executing the non-complex without spatial reasoning and single listening task and the complex without spatial reasoning and dual listening task ahead of the high-complex spatial reasoning and dual listening task in high proficiency undergraduate students' comprehension of the high-complex spatial reasoning and dual listening task. Accordingly, the consequence of executing the high-complex spatial reasoning and dual listening comprehension task with preceding lower-complexity tasks was juxtaposed with that of executing the high-complex spatial reasoning and dual listening comprehension task without preceding non-complex and complex tasks. Secondly, it delved into how learners' thoughts on task difficulty and Robinson's definition of task complexity are connected. Resolving the questions below made it possible to achieve the goals of this research:

1. Does executing a high-complex spatial reasoning and dual task, both with or without preceding non-complex -spatial reasoning and single task and complex -spatial reasoning and dual task, have a similar effect on undergraduate high-proficiency students' listening comprehension performance?

2. Is there any connection between how difficult a task is to participants and Robinson's definition of task complexity?

3. Methodology

3.1. Design and Context of the Study

Doing the present quantitative and quasi-experimental research was feasible by adopting the relative comparison group and correlational designs. The convenience sampling method was applied to include participants from the classes that the researcher was teaching in 2020-2021. The way two intact groups of high-proficiency participants in 4 non-profit university classes in Tehran, Iran executed the high-complex listening comprehension tasks was juxtaposed. Accordingly, executing listening tasks with a lower degree of complexity ahead of the high-complex listening task was the independent variable and listening comprehension was the dependent variable. The second design of this research, correlational design, opened the door for delving into the connection between Robinson's definition of task complexity and learners' thoughts on task difficulty.

3.2. Participants

The process of including particular participants in the present research and determining their language proficiency levels occurred by administering the Oxford Placement Test. Classes chosen to serve the purpose of this research were four general English ones with 120 female undergraduate university students of an art non-profit university in Tehran. The ages of these freshman, sophomore, junior, and senior students varied from 19 to 25 (M=21 years). They attended these classes on Saturdays, Mondays, and Thursdays in the fall semester of 2020 and 2021 for 16 sessions and each session length was 2 hours and 15 minutes. Participants were informed that the way they did on such a test would not bear upon their final score, they took the test. The way participants did on the Oxford Placement Test was not the same, thus they represented different language proficiency levels: low and high proficiency levels. High-proficiency students were included in this research as the ultimate participants. Students of two classes composed group 1 and those of two other classes composed group 2 participants. Both groups had an equal number of participants (16).

Table 1.
Demographic Background of the Participants of the Study

No. of Students	32 High-Proficiency Participants
Gender	Female
Native Language	Persian
Major	Art Majors
University	Art Non-Profit University
Academic Years	2020-2021

3.3. Instruments

3.3.1. Proficiency Test

The first step of the current research was testing participants on their language proficiency by utilizing the Oxford Placement Test which was the means of many previous studies to test language proficiency (Ahmadian, 2011, 2012; Murphy & Roca de Larios, 2010). It is a standardized means that provides an opportunity for testing participants on how good they are at grammar and listening by means of its multiple-choice grammar and double-choice listening items. Out of two hundred items of this test, one hundred are grammar items and the other one hundred are listening items. Forming two groups of high-proficiency participants was determined by how good they were at the proficiency test. 32 out of 120 students with grades greater than 122 were included in high-proficiency groups.

3.3.2. Tasks Utilized to Manipulate Different Ways of Ordering Tasks

What the current research needed to be conducted was differentiating two different orders of tasks, the non-complex, complex, high-complex order of tasks and the order in which the high-complex task is executed as the first set of tasks and complex and non-complex tasks were executed subsequently. The prerequisite was opting for one group of non-complex listening tasks, one group of complex listening tasks, and one group of high-complex listening tasks as the main instruments of the current research. The “Improve Your IELTS Speaking and Listening Skills” book was utilized as a reference to prepare all requisite listening tasks. The guiding framework and model for this research were Robinson’s TCF and his SSARC model. Differently demanding tasks, ±spatial reasoning tasks as one of the resource-directing dimensions and ± single tasks as one of the resource-dispersing dimensions, were extracted from TCF and non-complex, complex, high-complex order from the SSARC model.

Instruments utilized to manipulate the group of non-complex tasks were identified with a - spatial reasoning task and a single task. Without spatial reasoning and single tasks were simple along both resource-directing and dispersing dimensions. The benchmark for manipulating a without spatial reasoning listening task was possessing a limited number of spatial concepts, it was Gilabert’s benchmark when he researched without spatial reasoning demands by utilizing instruction giving map tasks possessing a limited number of spatial concepts such as left, right, and straight (Gilabert, 2007a). The second task of the group of simple tasks was a single listening task manipulated by means of executing only a single task at a time which is equal to how Robinson expounds single tasks.

The instruments of manipulating the group of complex tasks were a without spatial reasoning task and a dual task, against the resource-dispersing dimension that was made complex, the resource-directing dimension was kept simple that is actualizing the second principle of the SSARC model, intensifying the complexity of tasks should be commenced with resource-dispersing dimensions ahead of resource-directing dimensions. Manipulating without spatial reasoning tasks was elucidated above. Executing two tasks synchronically, providing answers to listening comprehension questions, and summarizing the listening task, was adopted as the approach of manipulating a dual listening task that is equal to how Robinson expounds dual tasks.

The instruments for manipulating the group of high-complex tasks were a spatial reasoning task and a dual task. Manipulating high-complex tasks was actualizing the SSARC Model’s ultimate step, intensifying the level of complexity on either dimension. Like Gilabert’s (2007a) and Gilabert et al.’s (2009) studies which were on instruction-giving map tasks with a large number of spatial concepts such as left, right, straight, up, down, front, back, utilizing a listening task with a large number of spatial concepts made it possible to manipulate + spatial reasoning. The dual task of the high-complex group was elucidated in the complex group. Sending all these treatment tasks with a checklist of three benchmarks, language, content, and length to 3 TEFL experts made it possible to test their validity. Experts checked the length, content, and language of tasks by utilizing the checklist. A Cronbach's alpha test was conducted to check the reliability of the spatial reasoning task. The result of the Cronbach's alpha test demonstrated a reliability of 0.70 for the spatial reasoning task. The inter-rater reliability for the dual task was 0.88 as it was demonstrated by the result of a Pearson correlation. The validity of each of the instrument items was checked by conducting the Pearson product-moment correlation test. The results of the Pearson product-moment correlation demonstrated that the correlation between spatial reasoning task items and the total scores was statistically significant (r for item 1 = .63; r for item 2 = .80; r for item 3 = .50; r for item 4 = .45; r for item 5 = .35, n = 34, *p* = .005). The correlation between dual task items and the total scores was also statistically significant (r for item 1 = .53; r for item 2 = .66; r for item 3 = .65; r for item 4 = .44; r for item 5 = .78; r for item 6 = .78, n = 34, *p* = .005). This means that the instruments were valid. The table of specifications below covers tasks utilized in this research (Table 2).

Table 2.
Tasks, Items, Dimensions, Distinct Levels of Cognitive Complexity

Dimensions	Different Degrees of Task Complexity	Tasks	Items
-Spatial Reasoning/ +Single Task	Non-Complex Tasks participants answered without spatial reasoning and single tasks questions	Task 1	10
- Spatial Reasoning/ - Single Task	Complex Tasks participants answered without spatial reasoning and dual tasks questions	Task 2	11
+ Spatial Reasoning / - Single Task	High-Complex Tasks participants answered spatial reasoning and dual tasks questions	Task 3	11

3.3.3. Task Difficulty Questionnaire

To provide an answer to the second question of this research, a task difficulty instrument was required. A task difficulty questionnaire which was also utilized by Zare-ee (2013) served this function and enabled researchers to delve into how participants' thoughts on task difficulty and hypothetically defined task complexity are connected. It achieves this goal by means of incorporating a statement and a question. "Please express your perception of the difficulty level of the listening task you just completed" is its statement, and its question includes "How did you find the task?" Participants demonstrated how difficult a task is to them by selecting and writing a response category of a five-point Likert scale that best described their thoughts on task difficulty. Five response categories were as below: "Very Difficult, Difficult, Average, Pretty Easy, Easy". They expressed their idea about task difficulty twice a session, once for the first task they executed and once for the second task they executed.

3.4. Data Collection Procedure

Commencing data collection for delving into the power of ordering tasks in undergraduate students' listening comprehension performance by juxtaposing the consequence of executing the high-complex task subsequent to non-complex, and complex tasks with that of executing the high-complex task executed as the first task that was succeeded by lower-complexity tasks occurred after testing participants on their language proficiency through the Oxford Placement Test which made it possible to include those participants that had a certain level of proficiency. Two groups of high-proficiency participants with a grade value greater than 122 were included to compare their listening comprehension of high-complex tasks.

The regular class time during the fall semester and four university classes were respectively the time and place of collecting data. Another certain time was appointed to collect the data of participants who missed the regular class time to execute listening tasks as a part of requisite data. Collecting all requisite data took three sessions. All of the listening tasks executed by a participant in either group over these three sessions were six with two tasks a session. Participants of each group executed the same quantity of tasks but in different orders.

This research delved into the power of executing tasks of a lower degree of complexity ahead of the high-complex task in executing the high-complex task by juxtaposing performance on the high-complex listening comprehension task that was executed subsequent to non-complex, and complex tasks with performance on the high-complex task executed in different order. Accordingly, the prerequisite for this comparison was developing non-complex, complex, and high-complex tasks. The approach expounded in Robinson's SSARC model was adopted to meet this prerequisite. Both resource-directing and dispersing simple tasks were considered non-complex, a resource-directing simple task but a resource-dispersing complex task were considered complex, and both resource-directing and dispersing complex tasks were considered high-complex. Accordingly, non-complex tasks were composed of a without spatial reasoning and a single task, complex tasks were composed of a without spatial reasoning and a dual task, and high-complex tasks were composed of a spatial reasoning and a dual task.

Among three sessions, the group that executed the high-complex task with preceding lower-complexity tasks (group one) spent the initial session on executing a non-complex without spatial reasoning and a single task, the middle session on executing a non-complex without spatial reasoning task and a complex dual task, and the final session on executing a high-complex spatial reasoning task and a dual task. Group two executed a high-complex spatial reasoning task and a dual task as the first set of tasks without preceding non-complex and complex tasks.

To achieve the goal of how participants' view of task difficulty and hypothetically defined task complexity are connected, participants were told to demonstrate how difficult a task is to them by means of one of the response categories of a five-point Likert scale (Very difficult, Difficult, Average, Pretty Easy, Easy) subsequent to executing tasks.

3.5. Data Analysis Procedure

Data analysis occurred subsequent to the methodical storage of collected data. The prerequisite to future descriptive and inferential analysis was scoring listening tasks executed by participants. Accordingly, the ultimate score value of each participant (32 score values) which was the mean of their scores on two high-complex tasks was calculated after scoring 64 high-complex listening tasks executed by them. The last data analysis was attributing a value to the response category (1= very difficult, 2= difficult, 3= average, 4= pretty easy, 5= easy) used by each participant after executing tasks to demonstrate how difficult a task is to them, three values were specified for each participant that executed three groups of tasks (the mean of difficulty of each group of tasks was specified).

The process of calculating score values and analyzing primary data made possible descriptive analyses that demonstrated the means and standard deviations of the participants. They were succeeded by inferential analyses that included an independent samples t-test since the Shapiro-Wilk test results demonstrated that data are normally distributed (Table 3), a one-sample t-test utilized for determining the difference between the mean of participants' thoughts on task difficulty and a specific value (1), and Spearman's rho correlations utilized for ranked data. The software utilized for descriptive and inferential analyses was SPSS 27.

Table 3.
Test of Normality for Groups 1 &2

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
the more complex task with preceding simpler tasks	.224	16	.030	.904	16	.094
the more complex task without preceding simpler tasks	.248	16	.009	.892	16	.059

a. Lilliefors Significance Correction

Table 3 continued.

4. Results

4.1. Comparing Two High-Complex Tasks Which Were Presented in Different Sequences

Answering this question was possible by having two groups. One of them executed the high-complex task as the last task subsequent to lower-complexity tasks but another one executed the high-complex task as the first task ahead of lower-complexity tasks. This question enabled exploring the advantage of executing non-complex and complex tasks ahead of the high-complex task for the quality of the high-complex task. Descriptive statistics of both high-complex tasks are covered in Table 4. This table exhibits the difference between the means of the two groups. The mean of the high-complex task with preceding lower-complexity tasks exceeded that of the high-complex task without preceding lower-complexity tasks (M= 2.87, M = 2.54, respectively).

Table 4.
Means and Standard Deviations of High-Complex Tasks

	Being preceded by simpler tasks	N	Mean	Std. Deviation	Std. Error Mean
high-complex tasks	1.00	16	2.5431	.96237	.24059
	2.00	16	2.8794	.75689	.18922

It was imperative to conduct a statistical test to check out the statistical significance of the difference between these two groups' means. An independent samples t-test was conducted (Table 5) as the data was normally distributed. Its result exhibited a p-value that exceeded .05, meaning the difference was statistically non-significant (t (30) = -1.09, P > .05). This means that the advantage of executing non-complex and complex tasks ahead of the high-complex task was statistically non-significant.

Table 5.
Independent Samples T-Test for Two Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
high-complex tasks	Equal variances assumed	.632	.433	-1.099	30	.281	-.33625	.30609	-.96137	.28887
	Equal variances not assumed			-1.099	28.422	.281	-.33625	.30609	-.96283	.29033

4.2. The Connection between the Subjective Rating of Task Difficulty and Task Complexity

This question was brought up to delve into the connection between the difficulty of tasks in participants' opinions and Robinson's definition of task complexity. How connected are participants' thoughts on the difficulty of tasks and the complexity of tasks which was the result of manipulating both spatial reasoning and single task dimensions as two dimensions of cognitive complexity? They are connected if the high-complex task is more difficult in the participants' opinion. Participants selected and then wrote on their answer sheet one option of a five-point Likert scale (very difficult, difficult, average, pretty easy, and easy) which was equal to their thoughts on task difficulty. A prerequisite to analyzing collected data was attributing a value to each option; the value of 5 was attributed to easy and the value of 1 to very difficult. Table 6 covers the descriptive statistics of participants' thoughts on task difficulty. Conducting the statistical test, a one-sample t-test, provided the means to scrutinize the connection between the difficulty of tasks in participants' view and their hypothetically defined complexity; strictly speaking, it made it possible to verify if the high-complex task was more difficult in participants' view. Another statistical test that is used to analyze ranked data, Spearman's rho correlations, was also conducted to make it possible to scrutinize the relevance of participants' view on task difficulty to hypothetically defined task complexity. Table 6 exhibits that participants took a different view on the difficulty of non-complex, complex, and high-complex tasks. The mean score of the high-complex task was lesser than that of non-complex and complex tasks (M = 3.63, M= 3.95, M= 4.33, respectively).

Table 6.
Means and Standard Deviations of Tasks Difficulty

	N	Minimum	Maximum	Mean	Std. Deviation
non-complex task	15	2.50	5.00	3.9500	.80844
complex task	15	2.50	5.00	4.3333	.79993
high-complex task	15	2.00	5.00	3.6333	.93954
Valid N (listwise)	15				

Accordingly, the nearest mean score to more difficult (one) was the mean score of the high-complex task by comparison with non-complex and complex tasks; but at the same time the one-sample t-test (Table 7) results verified that the mean score of the high-complex task was statistically significantly larger than the value of very difficult tasks(one) (t =10.85, $p < .05$). It means that the high-complex task was not very difficult in participants' view.

Table 7.
One Sample T-Test for Task Difficulty

	Test Value = 1					
					95% Confidence Interval of the Difference	
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
high-complex task	10.855	14	.000	2.63333	2.1130	3.1536

Spearman's rho correlations results (Table 8) proved that participants' thoughts on task difficulty and hypothetically defined task complexity are statistically significantly and positively connected (r_s (15) = .77, $p < .05$). Positive connection between task difficulty values of the non-complex and high-complex tasks means that increasing cognitive complexity of tasks was in tandem with increasing scores which were equal to participants' view on task difficulty. Accordingly, the high-complex task was not very difficult in the participants' opinion, as the high-complex task would be very difficult if Spearman's rho correlation demonstrated a statistically negative correlation.

Table 8.

Spearman's Rho Correlations for Subjectively Rated Task Difficulty

			non-complex task	complex task	high- complex task
Spearman's rho	non-complex task	Correlation Coefficient	1.000	.749**	.773**
		Sig. (2-tailed)	.	.001	.001
		N	15	15	15
	complex task	Correlation Coefficient	.749**	1.000	.708**
		Sig. (2-tailed)	.001	.	.003
		N	15	15	15
	high-complex task	Correlation Coefficient	.773**	.708**	1.000
		Sig. (2-tailed)	.001	.003	.
		N	15	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

5. Discussion

Robinson's SSARC model (2010) principle which emphasized executing tasks in order of the level of their complexity demonstrated the way to probe into the power of executing listening tasks with a lower level of complexity ahead of the high-complex task in the high-complex task in this research. Consistent with his model principle, a resource-directing variable (± spatial reasoning demand) and a resource-dispersing (± single task) one were delved into synchronically. Non-complex tasks were single and needless of spatial reasoning; complex ones were dual and needless of spatial reasoning; and the high-complex tasks were dual and in need of spatial reasoning. The linkage between task difficulty in participants' view and hypothetically defined task complexity was researched in the bargain. Robinson has clarified the linkage between complex resource-directing and dispersing variables and language comprehension and production by his cognition hypothesis (2003); the linkage between complex resource-directing variables and linguistic performance and the linkage between complex resource-dispersing variables and linguistic performance are opposite; the former is positive but the latter is negative. Nevertheless, the linkage between learners' linguistic performance and complex tasks obeying the principles of his SSARC model is vague.

As indicated by data analysis, the quality of the high-complex task executed as the first one and that of the high-complex task executed as the last one out of non-complex, complex and high-complex tasks diverge somewhat; this slight divergence that is statistically insignificant demonstrates lower-complexity tasks' failure to ameliorate comprehending the high-complex language. This research and Allaw and McDonough's (2019) research gave roughly similar results. However, this result is in opposition to Lee's (2021), Tabari and Cho's (2022), Santo's (2022), and Malicka's (2018) results which reflect the power of ordering tasks in participants' language comprehension and production whether positive or negative. This kind of divergence stems from the dissemblance between the level of complexity of this research's high-complex task and the level of complexity of those researches' high-complex tasks, this research's synchronous probe into spatial reasoning and dual task which demand congenital capability, and the dissemblance between the measurement means of linguistic performance in this research and those researches. Malicka's (2018) research proved that the fluency of learners' linguistic production is under the negative influence of ordering; the divergence between her result and this research result can be the power of the language production aspect researched. The connection between producing fluent language and ordering is probably stronger than the connection between comprehending language and ordering.

The result that non-complex and complex tasks were too weak to ameliorate comprehension of the high-complex language can be traced to participants' lack of spatial reasoning and multitasking abilities which affirms the important place of participants' innate capability outweighing the order of executing tasks in language comprehension. Providing learners with remedies for lack of spatial reasoning and multitasking abilities could intensify the power of executing tasks with a lower level of complexity ahead of the high-complex tasks in executing the high-complex task. Additionally, the power of cognitive complexity of tasks in comprehending them takes precedence over their executing sequence. The limitation of participants' attentional resources which probably has led to a lower degree of comprehension of the high-complex task should be remedied by adopting instrumental approaches other than executing non-complex and complex tasks ahead of the high-complex task. Perhaps engaging learners by utilizing technology, individualizing materials, intensifying the level of interaction between learners, sharing their noteworthy success, and having a communication group that opens a door for learners to share their opinions and feedback remedy the limitations of attentional resources.

The connection between how difficult a spatial reasoning and dual task is in the participants' view and how complex it is in Robinson's SSARC model was not affirmed in this research. The high-complex task was not very difficult in the participants' view, although it was more difficult as contrasted with lower-complexity tasks. The result earned in this research is roughly in agreement with Zare-ee's (2013) research result but in disagreement with those earned by Awwad (2019) and Sanajou et al. (2017). Their studies affirmed the linkage between complex tasks and task difficulty in participants' opinions. The contradiction between this research result and their studies that researched binary tasks is presumably the power of researching the triad tasks in this research that alleviated the difficulty of tasks in participants' opinions.

6. Conclusions

Language teachers or task designers make several decisions when they want to use tasks as a means which has the real-world task features to teach a foreign language. They should decide to consider cognitive complexity, task difficulty or condition first or integration of them, how to heighten task complexity, on resource-directing dimensions or resource-dispersing dimensions or on both of them, and how to order tasks, from non-complex-to-complex or differently.

Disapproving the effect of ordering tasks on how they are executed and the agreement between how participants think of task difficulty and hypothetically defined task complexity by this research results conveys messages that executing non-complex and complex listening tasks ahead of the high-complex listening task is not an instrumental means for forwarding how to execute the high-complex tasks and participants' view of task difficulty cannot be a proper benchmark for determining the cognitive complexity of tasks. Accordingly, this research does not corroborate Robinson's SSARC model. Participants' spatial reasoning and multitasking abilities and their language proficiency are probably more instrumental than the order they follow to execute the high-complex task. Participants comprehend the high-complex listening task approximately the same when they are at the same level of language proficiency even though they have received that task as the first task without preceding lower-complexity tasks or as the last task with preceding lower-complexity tasks. Spatial reasoning and multiple tasks are too demanding to be improved only by differentiating the order in which they are executed. L2 teachers should devote some specific time to improving learners' spatial reasoning and multitasking abilities by using similar instrumental activities.

The way participants executed the high-complex task was not in agreement with the way they thought of its difficulty level. Accordingly, learners' view of how difficult a task is cannot be a reliable predictor of their listening comprehension quality. Probably other benchmarks including the nature of task structures and designs, their spatial or causal reasoning levels, the procedure of executing tasks, the number of tasks executed at a time, the dependency of steps of executing tasks, or availability of task structure should be utilized for determining the cognitive complexity of a task that can be instrumental in learners' language comprehension.

This research can be instrumental to task and test designers, language teachers, and researchers. Further, spatial reasoning ability and multitasking skills are needed by everyone in the real-world. One of the most important implications of this research can be observed in English for specific purpose fields like engineering, science, technology, and math. Engineers, scientists, technologists, and mathematicians should have the spatial reasoning ability to succeed in their careers.

Language teachers and task designers should base their task designing and selection on the fact that the demands put on learners by L2 spatial reasoning tasks are more than learning a language, as they make learners strengthen their spatial reasoning ability in addition to improving their interlanguage system. Language teachers should teach their learners how to improve several skills synchronically, spatial reasoning ability, listening comprehension, and multitasking skills. Executing lower-complexity tasks ahead of the high-complex ones may be a weak means in this regard. Other means such as creating a mental map of their locations, solving puzzles, and playing relevant games can be instrumental to spatial reasoning ability.

There is a difference between learners' view of task difficulty and hypothetical definition of task complexity but it was observed that learners' view of task difficulty has no direct relationship with learners' performance on the high-complex task. Although the high-complex task was not very difficult in the learners' opinions, their views did not have a positive effect on their performance. Teachers should probably consider factors other than learners' subjective view of task difficulty in choosing appropriate tasks.

Researchers can use these listening comprehension tasks with a specific level of cognitive complexity to delve into the connection between cognitive task complexity, mode of language, and intelligence or affective variables. Test designers who construct test tasks for measuring linguistic knowledge should design tests based on the fact that performance on some tasks like the tasks of this research requires a specific ability other than linguistic knowledge not to decrease the construct validity of tests.

Task designers and language teachers can base their task selection activities on the results of this research that executing tasks with a lower level of complexity ahead of the high-complex task cannot be a remedy for learners' weakness in executing high-complex tasks. The influence of task complexity on learners' linguistic performance is more than that of ordering tasks.

The present research is limited in some respects: The connection between participants' variables such as their aptitude, motivation, anxiety, self-confidence, and so on and cognitive complexity or task presenting sequence was not clarified in order to check the importance of these variables in executing listening comprehension tasks. Researchers should delve into the interaction between participants' variables including self-confidence or aptitude and executing spatial reasoning and dual listening tasks. This research only concentrated on clarifying the power of executing circumstances without clarifying the power of teaching spatial reasoning ability. Further research should delve into the interaction of teaching spatial reasoning tasks and ordering tasks down to the instrumentality of teaching spatial reasoning in improving congenital spatial reasoning ability.

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