The Effects of Task Complexity on Input-Driven Uptake of Salient Linguistic Features

Mohammad Hossein Yousefi, (Corresponding Author),
Assistant Professor of TEFL, Department of English Language,
Bonab Branch, Islamic Azad University, Bonab, Iran
Email: mhh.yousefi@gmail.com

Farzad Rostami,
PhD candidate in Applied Linguistics, Department of English Language,
Bonab Branch, Islamic Azad University, Bonab, Iran
Email: farzadr79@gmail.com

Davoud Amini,
Assistant Professor of TEFL, Department of English Language and Literature,
Azarbaijan Shahid Madani University, Tabriz, Iran
Email: davoudamini2014@gmail.com

Abstract

The present study investigated the effects of cognitive complexity of pedagogical tasks on the learners′ uptake of salient features in the input. For the purpose of data collection, three versions of a decision-making task (simple, mid, and complex) were employed. Three intact classes (each 20 language learners) were randomly assigned to three groups. Each group transacted a version of a decision-making task in dyadic condition. The results of the statistical analysis (one-way ANOVA) revealed significant differences among the groups. The participants in complex group tended to produce more uptakes. The results of the present study revealed that manipulating cognitive complexity of pedagogical tasks led to more uptake of the linguistic items made salient by the teacher and triggered much interaction between the participants. The study, also, has a number of theoretical and pedagogical implications for SLA researchers and syllabus designers.
Keywords: Task Complexity, The Cognition Hypothesis, Learner Uptake, Interlanguage Development

It is argued that Task-based language Teaching creates more favorable conditions for the development of second language acquisition than does an approach that focuses on the explicit teaching and learning of the rules of the language alone (Long, 2015; Mayo & Azkarai, 2016; Prabhu, 1987; Tavakoli, 2014; Van den Branden, 2015). Moreover, tasks have, over the three decades, become well established as a unit of design in a communicative curriculum (Ahmadpour & Yousefi, 2016; Byrens, 2014; Goodfroid & Michel, 2015; Norris, 2015; Samuda, 2015). In addition, they are designed to engage learners in realistic communication on the grounds that engagement in communicating meaning is likely to lead to implicit learning (Barlat, 2010; Byrnes, 2014; Crabbe, 2007; Hadley, 2013).

Research on task design attempts to find variables in task design that will lead to recognized second language acquisition processes such as negotiation or noticing (Ellis, 2003). furthermore, the great advantage of tasks is that they allow for learner engagement in realizing the communicative potential of the encoded semantic resource (Widdowson, 2003) and the most important role for a language task is to confront learners with certain language problems in completing the task (Long, 1985).

The rationale for task-based teaching (TBT) comes from different camps; Ellis (2003) provided psycholinguistic rationale, whereas, Skehan (1998) took a more cognitive approach to advocate it. In Widdowson′s (2003) terms, Skehan provided the most comprehensively theoretical rationale for task-based learning. Skehan (1998) pointed out that as an approach to instruction, TBT is theoretically defensible and practically feasible. The assumption here, then, is the fact that performing tasks will engage naturalistic acquisitional mechanisms, cause the underlying interlanguage system to be stretched, and drive development forward.

By the same token, it has been argued that the ordering of different tasks has prime importance in task-based instruction (Long, 2015). In the same vein, authors working within this framework argue that language learning and teaching should be sequenced by means of tasks; therefore, tasks form the basis of the curriculum (Albert & Kormos, 2004). No doubt, information about the cognitive complexity of tasks will be of prime importance to syllabus designers and language teachers adhering to TBLT (Gilabert, 2007; Robinson, 2007).

Literature Review

Robinson (2007) argues that task complexity is the result of the attentional, memory, reasoning, and other information processing demands imposed by the structure of the task to the language learner. Task complexity, differences in intrinsic cognitive processing demands of tasks, will explain within-learner variation in successfully completing any two tasks (such as doing simple addition versus calculus, or doing

the simple versus complex intentional reasoning task (Robinson, 2007). In the same way, Ellis (2003) believes that task complexity is the extent to which a particular task is inherently easy or difficult. Different dimensions of task complexity are *code complexity, cognitive complexity,* and *context dependency.*

The ordering of different tasks has prime importance in task-based instruction. Seen from the same angle, Robinson (2007) relates task complexity, cognitive demand, to options in syllabus design and to other issues in the implementation and assessment of task-based instruction. Robinson (2005) argues that tasks should be designed and sequenced for the language learners on the basis of gradual increase in their cognitive complexity.These designs and sequencing decisions should be the foundation of the task-based syllabus (Long & Crookes, 1992; Robinson, 2007; Van den Branden, 2006).

Skehan (1998) reiterates that knowledge of task difficulty provides the teacher or syllabus designer with information about the level of challenge that a task is likely to contain, a level which the teacher will then have to match with his or her knowledge of the students who will do the task.

Additionally, Yousefi, Mohammadi, and Koosha (2012) presented the rationale for task-based teaching and task complexity and discussed its relevance and significance within the SLA approaches to language learning. The study also provided the implications of task complexity for pedagogy. In the same manner, Mohammadi, Yousefi, and Afghari (2012) critically reviewed the significance of the construct of task complexity in grading and sequencing of pedagogical tasks in task-based approaches to foreign language teaching.

In an empirical study, Yaghoubi-Notash and Yousefi (2011) focused on Iranian students in teacher-initiated focus on form episodes. The Chi-square results indicated that task complexity could not determine the rate of uptake, but within the scope of the uptakes that occurred the successful ones were significantly due to task complexity. In the same fashion, Farrahi and Yousefi (2018) investigated language-related episodes in task-based interaction. The study found that cognitive complexity led to more language-related episodes. The results also suggested that language related episodes associated with grammatical rules rated highest in frequency compared with other errors.

In a descriptive study, Yousefi and Biria (2011) investigated the interactional feedback and learner uptake in the interaction between teacher and learner. The study found the frequency of different interactional feedback type in the interactions. The results of the study suggest that a large proportion of the student turns with error occurred in complex task. In both simple and complex tasks, recasts were the largest interactional feedback type was used.

Notwithstanding, these empiricals have investigated the effects of manipulation of task complexity on the amount of interaction triggered between teacher and student (Ahmadpour & Yousefi, 2018), the effect of task complexity on Form Focused Episodes (Yaghoubi-Notash & Yousefi, 2011), the effect of task complexity on language related episodes and error types (Farrahi & Yousefi, 2018), and the effect of task complexity on the success of learner uptake (Salimi & Yousefi, 2008); finally, Yousefi and Afghari (2012) investigated relationships between task-generated interaction and students′ self-repair in task-based classes.

All of these and other related empirical studies investigated the interaction of the participants in monologic condition. The previous studies have also investigated the immediate and reactive uptake on the part of the participants. The present study aims to fill the gap by investigating the issue under question in three levels of cognitive complexity as well as it investigates students′ uptake in dyadic condition, in which the participants are involved in pair transacting the required tasks. Third, the present study aims at investigating the uptake of linguistic items made by the teacher as one mechanism to raising students′ awareness of their erroneous utterances.

Theoretical Framework

Two major opposing claims have been made with respect to how task-related variables affect learners′ performance. According to limited capacity′ hypothesis (also referred to as the 'trade-off′ hypothesis) of Skehan (1998), Skehan assumes a single-resource model of attention and claims that learners are not capable of paying simultaneous attention to the three main aspects of language use: complexity, accuracy, and fluency. He argues that attention to one aspect is done at the expense of the others. Thus, attention to complexity, for instance, likely results in decreased fluency, and vice versa. Based on the cognition hypothesis, Robinson (2007) assumes a multiple-resource model of attention and argues that learners are capable of attending to different aspects of language performance as needs arise performing the tasks. In this model, simultaneous attention to different aspects of L2 use is considered not just possible, but natural.

Robinson′s Cognition Hypothesis (2005, 2007) claims that increasing the cognitive demands of tasks along certain dimensions will (a) push learners to greater degree of accuracy and complexity of L2 production in order to meet the greater functional and conceptual communicative demands they place on the learner, (b) promote interaction, and heightened attention to and memory for input, so increasing learning from the input, (c) result in longer term retention of input, and (d) cause automaticity and efficient scheduling of the components of complex L2 task performance.

More importantly, the Cognition Hypothesis predicts that along resource-directing dimensions more interactive complex tasks will result in greater amounts of interaction, and negotiation for meaning. Following Long (1996), the Cognition Hypothesis claims that such negotiation provides a content for attending to problematic forms in the input and output, and additionally that on complex versions of tasks, there will be greater attention to, and uptake of forms made salient during provision of *reactive* Focus on Form techniques such a recast. Alternatively, where *proactive* Focus on Form is provided, for example, in the form of pre-modified input to the task, then it similarly claims there will be greater use of this on complex, versus simpler task versions (Robinson & Gilabert, 2007).

Learner Uptake

There has been increased research into the learner ʻuptakeʼ during the past decades (Ellis, Barkhuizen and Loewen, 2001; Loewen, 2005; Lyster & Mori, 2006). It has been suggested that uptake leads to increased fluency (Swain, 1995), allows for an operationalization of pushed output in classroom setting (Swain, 1985), and allows for learners to reanalyze and modify their nontarget output as they test new hypotheses about the target language (Lyster, 1998); and, finally, successful uptake is the best overall predictor of test performance (Loewen, 2004).

Swain (1985), in the same vein, argued that the notion of uptake in classroom studies provides an effective tool for identifying patterns in teacher-student interaction that include a wide range of learner responses following teacher feedback, allowing for an operationalization of pushed output in classroom settings.

Research Question and Research hypotheses

The present study aimed to address the following research question:

RQ: Are there any significant differences between the cognitive complexity of pedagogical tasks and uptake of salient features made salient by the teacher during task performance?

H_0: There is not significant differences between Task Complexity and uptake of salient features in the input.

H_1: There is significant differences between Task Complexity and uptake of salient features in the input.

Methodology

Participants

Three intact classes were selected as the participants of the present study. The participants were undergraduate students enrolled in Oral Reproduction of Stories at

the University of Payam-e-Noor, Baneh, Iran. They ranged between 18 to 23 years old (mean = 21). They had Kurdish as their first language and learned Persian as their L2. English is regarded as their third language. The participants had exposure to English language for two successive years, communicatively. Their classes met twice a week and they were taught English through Task-based approach; to consolidate new linguistic structures and concepts, the students were given pedagogical tasks to transact at the end of the classes. Thus, they had the experience of performing the tasks as classroom activities.

Materials

For the purpose of data collection, a decision-making task at three levels of cognitive complexity was designed by the authors. To validate the designed tasks, a number of measures were taken including conducting a pilot study with up to seven participants other than the participants of the present study. This, in turn, led to the deletion of the ambiguous parts of the tasks. Task Complexity, here, is operationalized as ″reasoning demands″ dimension. Prabhu (1987) claims that tasks requiring selective information transmission +*reasoning* to establish causality, and justification of beliefs are more complex than tasks requiring non-selective information transmission, without these demands. Robinson (2007) maintains that tasks which require no causal reasoning to establish event relations, and simple transmission of facts, compared to tasks which require the speaker to justify beliefs, and support interpretations of why events follow each other by giving reasons which require expressions such as logical subordinators (*so, because, therefore, etc*.). In the case of reasoning about other people′s intentions and beliefs, use of psychological, cognitive state verbs (e.g., *know, believe, suppose*, *think*) are required. Both of these, he argues, introduce complex syntactic complementation (Robinson, 2007). Following the Cognition Hypothesis, Robinson (2005) hypothesized that there would be more *interaction and negotiation* on the more complex task, as well as learners would look for more and more help in the input as task demands increases in complexity.

The simple task required the participants to take a series of actions and enumerate what activities were logical and appropriate considering the situation. In the mid-task, on the other hand, the participants were asked to take a series of activities and give sound reasons and justifications for the actions they take. The problem, however, is more complicated in complex task. Apart from giving sound reasons and justifications for their activities, the number of elements is increased, contributing to the *task complexity*. As Kuiken and Vedder (2007) pointed out, an increase in the number of elements seemed to imply almost automatically and increased in the number of reasoning demands required by the task. The cognitive

complexity of task, in Complex Task, can be attributed to ″interconnectedness″ of the elements.

Procedure

Prior to conducting the study, the participants fill in the contest form to voluntarily participant in the research project. Afterwards, in performing the tasks, participants sat in pair to transact the required task in dyadic condition. No participant was present other than the first author as both the teacher of the course and the researcher. The researcher established the rapport with the participants and explained the objective of the study. The participants were also told that their performance would not have affected their final exam scores. The data collection was conducted in a quiet room at the university of Payam-e-Noor, Baneh, Iran. Prior to the task performance, the researcher told them about the demands of each task and they performed the specified task in pair. The participants, in pair, performed the required task and on the occurrence of erroneous utterance on the part of either participant, the researcher provided them with corrective feedback such as recast or prompt. The researcher deliberately made some salient linguistic items in his speech to investigate students′ upake of these salient linguistic items. The participants in class A performed the simple task and the students of class B did the mid-task. Finally, the latter class transacted the complex one. Each pair of participants was given up to fifteen minutes to do the required task and while performing the task and in the face of an error, they were given negative feedback to correct their erroneous utterances. The whole procedure of task performance was audiotaped. Later on, the data were transcribed by the first and second authors.

Results

Table 1: delineates the descriptive statistics of the study e.g. Mean, SD for the three groups of the participants.

Descriptive Statistics

Table 1. Descriptive statistics of uptake of salient linguistic

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Simple	20	2.9500	1.31689	.29447	1.00	5.00
Mid	20	5.9500	1.53811	.34393	3.00	9.00
Complex	20	9.9500	2.30503	.51542	6.00	14.00
Total	60	6.2833	3.37534	.43575	1.00	14.00

The mean and standard deviation (SD) for the simple task group were 2.95 and 1.31, respectively. The mean for the Mid task group was 5.95, and SD was 1.53, whereas, for the complex task group mean was 9.95, and SD was 2.30. (each group included 20 participants).

ANOVA

Table 2. The results of One-way ANOVA Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	493.333	2	246.667	78.613	.000
Within Groups	178.850	57	3.138		
Total	672.183	59			

Table 2 shows the results of the one-way ANOVA test. The $F_{2, 39} = 9.0.5$ at the P level of 0.05. Thus, the null hypothesis, "there are not significant differences between Task Complexity and uptake of salient features in the input", is rejected, and alternative hypothesis stating that "There is significant difference between Task Complexity and uptake of salient features in the input" is verified. This indicates that the level of cognitive complexity of pedagogical tasks employed for the purpose of data collection had noticeable effects on the amount of uptake of salient features in the input.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: uptake of salient features in the input

	(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.
LSD	Simple	Mid	-3.00000[*]	.56015	.000
		Complex	-7.00000[*]	.56015	.000
	Mid	Simple	3.00000[*]	.56015	.000
		Complex	-4.00000[*]	.56015	.000
	Complex	Simple	7.00000[*]	.56015	.000
		Mid	4.00000[*]	.56015	.000

*. The mean difference is significant at the 0.05 level.

To determine the location or the source of the difference among the groups, LSD Post Hoc test was done. The result of the test gave support in favor of the differences among the three groups of the study. The results for the LSD post-hoc test reflected more power to find differences among the groups.

Discussion

The findings of this study are in line with the predictions of The Cognition Hypothesis (Robinson, 2007) in that increasing the cognitive demands of pedagogic tasks has important effects on *gaining* (creating the conditions for noticing and uptake of aspects of input made salient through interventions, such as flooding, input enhancement, and recasting). As the results of statistical analyses demonstrated, there has been more uptake rate in complex task group compared to mid task and simple task groups. This high rate of uptake moves in complex task can be attributed, largely, to the cognitive demands of the task at hand, which imposes extra burden of information processing, memory capacity, and attentional recourses on learners′ mental capacities which, in turn, push them to go beyond their current level of language proficiency and stretch their interlanguage systems and use syntactic rather than pragmatic mode of language (in Givon′s, 1989 terms); syntactic mode of language is characterized by greater use of morphology, greater syntactic subordination, and a higher noun to verb ratio. Altogether, these factors cause the participants′ utterances to be more erroneous in complex task compared to Mid and simple task, which, in turn, necessitate focusing on form and providing opportunities for learner uptake.

Moreover, as the results of the statistical analyses revealed, there has been more uptakes in the complex task group compared to its mid and simple versions. This is because complex tasks require complex language to be transacted. Complexity, here, is the extent to which learner produces elaborated language (Ellis & Barkhuizen, 2005). In the same vein, Skehan (2001) suggested that language that is at the upper limit of students′ interlanguage systems, and thus is not fully automatized; it can be considered more complex than language that has been fully internalized. The explanation may lie in the fact that complex tasks need more controlled language than automatized one and for this reason they stretch interlanguage system more than mid and simple tasks. This study, moreover, is in line with Givon (1989) in that complex tasks would promote greater accuracy and greater complexity while simple tasks would lead to lower complexity and accuracy.

The findings of the current study sit well with Yousefi (2008) in that he opertationalized task complexity at two levels of cognitive complexity. The results of the study revealed that task complexity leads to more successful uptake on the part of the participants. He attributed the high rate of uptake moves in complex task, largely, to the cognitive demands of the task at hand, which imposes extra burden of

information processing, memory capacity, and attentional recourses on learners′ mental capacities which in turn push them to go beyond their current level of language proficiency and stretch their interlanguage systems and use syntactic rather than pragmatic mode of language (in Givon′s, 1985 terms); syntactic mode of language is characterized by greater use of morphology, greater syntactic subordination, and a higher noun to verb ratio. All in all, these factors cause the participants′ utterances to be more erroneous in complex task compared to simple task (Yousefi, 2008).

The findings of this study are contrary to VanPatten (1990) who maintains that tasks which are cognitively demanding in their contents are likely to draw attentional resources away from language forms, encouraging learners to avoid more attention-demanding structures in favor of simpler language for which they have already developed automatic processing. As noted earlier, complex tasks provide learners with more opportunities for ″attention″ than simple tasks. Given this fact, Schmidt (2001) pointed out that attention is what allows speakers to become aware of mismatch or gap between what they can produce and what they need to produce, as well as between what they produce and what proficient target language speakers produce.

The findings of this study also sit well with the claim of Ellis and Barkhuizen (2005) in that task demands push learners to perform tasks in certain ways, prioritizing one or another aspect of language. In so doing, complex tasks push learners to prioritize accuracy and complexity over fluency (as argued by Robinson, 2005). When learners value accuracy, their attention will be largely devoted to linguistic forms. Trying to be more accurate in complex tasks, they may make more code-related errors in task performance. As a reactive Focus on Form, teachers might provide learners with a variety of corrective feedback. Learners may respond to teachers′ feedback in the form of uptake and their uptakes may be successful or unsuccessful. Under some circumstances, teachers′ corrective feedback may go unnoticed on the part of the learners or they may simply notice the discrepancy between the target-like item and their own utterances without producing uptake. In other terms, No Uptake category cannot be assumed as not noticing the corrective feedback. In some cases, it may be because of the demands and structure of tasks that push them to focus on other aspects of language (e.g., focusing on message to be transacted rather than form).

The present study, also, lends support to the predictions of The Cognition Hypothesis (Robinson, 2005, 2007) in that task complexity pushes learners to greater lexical density, grammaticalization, and syntacticization. Participants in the complex task group have used more vivid language in terms of lexicon and linguistic complexity compared to participants in the mid simple task groups.

The findings of this study can be justified by Swain (1995) in that increasing the cognitive and conceptual demands of the task may lead the learner to push output, to meet those demands causing reanalysis and restructuring of current linguistic resources. The explanation of the effects of cognitive complexity of the tasks on learning opportunities was provided by (Robinson, 2005) in that the greater the cognitive demands of a task, the more they engage *cognitive resources* (attention and memory), and so are likely to focus attention on input and output, which will have *performance effects*. Robinson further notes that more complex tasks should lead to more pushing of output and analysis of IL than simpler counterparts. This should lead to more 'noticing' of relevant forms in the input and problematic forms in the output, leading to more incorporation (of forms in the input) and modification (of problematic forms in output) (Robinson, 2007). Learners in complex task were asked to justify the actions they would take and sequence their activities. Moreover, the *interconnectedness* and the different role relationships among the characters in complex task required them to establish different cause and effect relationships. Overall, then, the participants were under the obligation of using more elaborated, controlled, and developmentally later structures to meet the demands of the complex task which in turn led to high number of Focus on Forms Episodes and consequently high number of uptakes.

This study had a number of limitations which should be acknowledged: firstly, the statements made in this study have referred to a particular type of task (decision-making task) under a particular kind of interactive condition (dyadic condition). Thus, caution should be exercised about the generalization of the findings of the study. Secondly, this study is conducted with relatively low number of the participants.

Conclusion

The present study has a number of theoretical and pedagogical implications for SLA researchers, syllabus designers, and language testing specialists. Firstly, it indicates that task complexity leads to more learner uptake and consequently more opportunities for Focus-on-Form, pushed output, ″noticing″, and language acquisition opportunities. Secondly, this study suggests that task-based teaching demands proficient language teachers that should react promptly to the learners′ non-target like utterances. Thirdly, the implications of this study for syllabus designers is that cognitive complexity is a more robust and valid criterion for selecting and grading of pedagogical tasks. That is to say, task complexity can be manipulated for the purpose of matching with learners′ developmental sequences and their proficiency levels. Furthermore, task complexity can be manipulated in order to optimize opportunities for 'noticing' and for interlanguage development.

As pointed out by Gilabert (2007), the manipulation of task complexity can be combined with an array of pedagogical forms of intervention such as input flooding, recasts, or elicitations to achieve higher levels of accuracy. Likewise, Robinson (2005, 2007) argues that if increasing complexity long resource-directing variables has the potential to draw learners′ attention to the forms in their own production, it can also lead them to focus on the input they receive.

It can be acknowledged that the present study never claims that learner uptake can be taken as tantamount to language acquisition. Like in many other studies (e.g. Ellis, Barkhuizen and Loewen, 2001; Loewen, 2004), it claims that uptake can be *facilitative* of language acquisition. However, there remains an open question: To what extent can uptake lead to language acquisition?

One of the pedagogical implications of this study is highlighting the significance of corrective feedback and uptake in task-based teaching. As Skehan and Foster (2001) maintained, the central challenge in task-based approaches to instruction is to learn how to enable or predispose the learner to direct adequate attention to form, and how this directed attention can lead to higher levels of accuracy *and/or* the use of more cutting-edge language. Other empirical studies can be done to investigate the efficacy of different corrective feedback across task complexity dimensions and input-driven vs. output-driven salient linguistic forms in task-based interaction in dyadic condition.

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Appendix

Complex Task

Suppose you live in a college dormitory in a room shared by a group of five students including you. You have agreed upon doing chores (e.g. cleaning the room, washing dishes) altogether. You take the responsibility and do whatever needed, after a while you realize that your roommates avoid responsibility. You decide to quit your endeavors. But after two or three days you come to the conclusion that none of them take the responsibility. They always get up too late to make breakfast and you stay hungry and suffer from other problems. What would you do then? Do you take responsibility again or behave like them? What are your **reasons** and **justifications**? Take a series of actions and justify them. If they change their way of doing things, what will happen to you? Is there any solution to get rid of this situation? Discuss it in terms of pro and cons?

Your roommates include:

1. Your classmate (four years younger than you)
2. An athlete (a member of the university′s boxing team)
3. A disabled student
4. a university student from a foreign country

Authors′ Biography

Mohammad Hossein Yousefi is an Assistant Professor of TEFL at Islamic Azad University of Bonab Branch. His areas of interest are Teacher Education, L2 Vocabulary Teaching, and Meta-Analysis. His recent publications appeared in *Asian-Pacific Journal of Second and Foreign Language Education* and *Reflective Practice Journal.*

Farzad Rostami is a PhD candidate in Applied Linguistics at Islamic Azad University of Bonab Branch, Bonab, Iran. His main areas of research interest include Teacher Education, Second Language Acquisition, and Discourse. He has a number of publications in national and international journals.

Davoud Amini is an Assistant Professor of TEFL at Azarbaijan Shahid Madani University. He has got his BA in Translation from Allameh Tabatabai University and his MA and PhD in English Language Teaching from Tabriz University. He has been an Assistant Professor at Urmia University from 2013 to 2014, and a staff member at Islamic Azad University from 2002 to 2012. His areas of interest are Psychology of Second Language Acquisition and Second Language Skills. He has published books and articles in these areas. Currently, he is the Head of the English Department at Azarbaijan Shahid Madani University.