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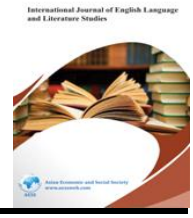

THE IMPACT OF TASK TYPE AND DIVERGENT THINKING ON READING PROFICIENCY

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ABSTRACT

Recent trends in pedagogy have focused on more effective ways of teaching reading for the impact it has on general language proficiency. In the present study, we aimed to explore the influence of the cognitive style, convergent/divergent thinking, on reading comprehension performance through convergent versus divergent task types. For this purpose, 93 Iranian EFL students who were 18-26 and studied at the B.S. level at University of Social Welfare and Rehabilitation Sciences were selected. Being within the same range of reading performance, they were given the Torrance Divergent Thinking Test and were assigned to two groups so that there were roughly equal numbers of divergent and convergent thinkers in each. Next, the two groups took the Nelson's reading comprehension test to ensure initial reading ability homogeneity. The experimental and the control groups then received treatment in the form of task-based instruction through either divergent or convergent tasks respectively over a period of one semester. To assess the reading comprehension gains of the participants at the end of the treatment, four types of reading multiple choice items, i.e. simple factual, referential, inferential, and multiple-response items, were used. The collected data were analyzed through Multivariate ANOVA, using SPSS software. Results indicated that the best results were achieved when divergent thinkers of the divergent task type group answer referential, and multiple-response items whereas the worst results were obtained when convergent thinkers in the convergent task group's performance on multiple-response items was used as the criterion for reading assessment. Results also showed that a task-based course of instruction through convergent or divergent tasks causes the participants to have respectively lower or higher gains on the divergent thinking test.

Keywords: Task-based instruction, Convergent task, Divergent task, Divergent thinking, Reading comprehension

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INTRODUCTION

Observations suggest that a large number of EFL university students are not able to read and understand materials in the English language effectively (Valencia and Buly, 2004; Vlack, 2009), which may affect their academic performance. In fact, effective teaching of reading has long been recognized as vital in second language learning (Carrel, 1989). Readers read texts in order to get some sense whether it be facts or feelings out of text (Graesser *et al.*, 1994; Nuttall, 2005), and they do so by cognitively interacting with the text (Nuttall, 2005) and by utilizing not only linguistic and background knowledge but also cognitive capabilities such as inferencing during reading (Grabe and Stoller, 2002). Consequently, the ultimate success in reading is the result of both linguistic/conceptual knowledge and readers' cognitive characteristics. Bachman (2000) grouped research related to factors that affect language test performance into three interrelated areas: characteristics of the testing procedure (as relevant to test method facets), characteristics of the test takers themselves, and the processes and strategies used by test takers in response to test tasks. The present study aims to explore the possible impacts of the interactions among the three on EFL learners' reading comprehension performance.

In the realm of learners' cognitive characteristics, different cognitive styles have been studied in connection with various language skills and components (Salmani, 2006; HajiPourNezhad and ShokrPour, 2012). In the same line, one well-documented learner characteristic is the convergence/divergence cognitive style. The terms convergence and divergence are adopted from Kolb (1984) experiential learning theory in which convergent cognitive style learners do best in situations where there is a single best solution to a problem while divergent cognitive style learners perform better in situations with alternative ideas and answers. Convergent thinking emphasizes recognizing the familiar outcome, reapplying techniques, and accumulating information. Divergent thinking, however, causes the learner to generate and evaluate many creative ideas and draw unexpected connections (Duff, 1986). There is ample controversy in the field as for the effect of convergent versus divergent thinking style on second language learning and academic achievement. While writers in Duff (1986) camp believe that convergent thinking style leads to more success, others in Getzels and Jackson (1962) school of thought maintain a close tie between divergence and higher achievement.

The relationship between convergence/divergence and second language learning seems to be a mutual one so that studies have quite controversially confirmed that specific instruction demanding either convergent or divergent thinking has effects on divergent thinking scores (Manskem and Davis, 1968; Bialystok *et al.*, 2004; S. *et al.*, 2008). Hommel *et al.* (2011) believe that, in general, benefits in convergent thinking cause losses in divergent thinking. This outcome is consistent with previous research findings indicating that monolinguals outperform bilinguals in verbal fluency tasks (Rosselli *et al.*, 2000; Gollan *et al.*, 2002). This finding, however, does not seem to fit with

the general expectation that bilingualism is associated with greater cognitive flexibility and numerous studies that seem to support this expectation (Ricciardelli, 1992; European Commission, 2009).

The language teaching profession has long begun to shift its focus towards actively engaging learners with the text by linking social context and cognitive development (Vygotsky, 1987), and the above controversy is very important when it comes to task-based language teaching, an important dichotomy of whose tasks centers around convergent versus divergent tasks (Duff, 1986). The psycholinguistic approach to task-based language teaching, also known as the cognitive approach (Skehan, 1998; Ellis, 2003) uses this classification to refer to tasks that are consistent with the two cognitive modes of convergent versus divergent thinking style so that with a cognitive information processing perspective in task-based activities, as a part of the problem solving process, readers collaborate in convergent or divergent styles to explore the meaning structures of the text (Richards and Rodgers, 2001). It is believed that such different task types cause learners to focus on different characteristics of the text because the demands of tasks are not the same (Joe, 1998). Convergent tasks demand all participants to have the same goal as a regarded outcome; with divergent tasks, the goals are expected to be different. The two task types activate different cognitive strategies. Therefore, the outcomes of the two task types may be different when performed by learners with different cognitive styles (Pica *et al.*, 1993).

Apart from the specific cognitive style that learners carry with them into the learning environment, the type of reading questions they are asked also influences their reading performance. This has been comprehensively addressed by Bachman (2000) under the title of test method facets, suggesting the wide range of variations in test rubrics and procedures that leave impacts on the performance. In fact, the concept of "reading comprehension" has not lent itself well to a clear operational definition so that it has been mostly defined by many measures used in its assessment (Frith and Snowling, 1983; Myles *et al.*, 2002; Daly *et al.*, 2005). Perhaps, this is partly due to the fact that each test only touches a limited select piece of a very complex overall construct (Storch and Whitehurst, 2002; Jenkins and Fuchs, 2003; Lorch *et al.*, 2004; Nation and Snowling, 2004; Pearson and Hamm, 2005; Ouellette, 2006). However, most reading comprehension research studies still use only one measure and response form despite the fact that many investigations inform us about the limitations in using one single test in the assessment of reading comprehension (Pearson and Hamm, 2005; Young, 2005; Cutting and Scarborough, 2006; Fletcher, 2006). For example, the skills assessed through each of the four types of factual, co-referential, inferential, and multiple-response test items are different. Fletcher (2006) further emphasizes this point by stating that "a one-dimensional attempt to assess reading comprehension is inherently imperfect" (p.324). In the present study, there has been an attempt to incorporate a manageable number of variables related to reading comprehension performance from cognitive psychology, communicative task-based language teaching, and test method facets in language testing into a controlled study. As

mentioned above, numerous studies have been conducted on reading comprehension, cognitive style, and task-type, as well as test item type, each in isolation, but, to the best of our knowledge, no research has been done to explore the possible interactions among these four areas when it comes to actual classroom instruction. Our study aims to see how the development of reading comprehension is affected by task-type mediated by cognitive style and test method (test item type) while previous studies have focused on the relationship between either cognitive style and reading or task-type and reading. Nevertheless, we assume that there must be a close link between students' performance on different task types and their cognitive styles as well as the test item types they answer. Therefore, the results of this study will shed light on the development of reading comprehension from an information processing perspective, perhaps creating a shift from a uni-dimensional look at reading comprehension to a multi-faceted understanding.

MATERIALS AND METHOD

Participants

In this randomized controlled study, 93 female intermediate students who enrolled for General English to fulfill a course requirement at the University of Social Welfare and Rehabilitation Sciences in Tehran participated in a four-month treatment. The subjects were randomly selected from the total of 232 students who were aged 18-26 and all had studied English at the high school level for the previous four years. Informed consent forms adopted from the sample consent forms given in How to Design and Evaluate Research in Education by Frankel and Wallen (2003) were signed by the students to participate in the study.

Instruments

The subjects of the study were given a reading proficiency pretest developed and validated by the researchers of the study particularly for this research and the Torrance Divergent Thinking Test. After gathering the data , those above the mean score were classified as the divergent thinkers and those below it as the convergent thinkers. The concurrent validity of the reading test using Nelson Proficiency Test turned out to be 0.80 and its test-retest reliability 0.87. The results of these two tests enabled the researchers to match the participants into two homogeneous groups based on their vocabulary performance and cognitive style type so that there were roughly equal numbers of convergent and divergent thinkers of the same reading comprehension ability range in each of the two convergent and divergent task groups. Thirty reading passages were selected from Academic Encounters as the teaching material of the course for both groups. The next step was to develop thirty convergent and thirty divergent tasks as different tasks for the teaching material of the course for the two groups. The same instructor (i.e. the researcher) taught both the experimental and control groups once a week for a period of four months. After the treatment, a reading proficiency posttest parallel to the pretest was used to compare the results. The Torrance Divergent Thinking

Test was also used to assess divergent thinking changes as the result of instruction among different subject groups.

Each of the two parallel reading proficiency tests comprised seven reading passages adopted from EFL series. The total number of questions (multiple/choice and multiple/response items) designed for the whole test amounted to 40. Reading comprehension questions were of the following four types:

1. Simple factual: these items required that the examinees scan for one single bit of information presented in one spot of the reading passage.
2. Co-referential: these items needed the candidates to collect items of information from two or more parts of the reading and put them together to come up with the response.
3. Inferential: students were expected to make inferences or read between the lines to provide answers to these items.
4. Multiple-response: unlike the above three types, these items had more than one single correct response and the test takers were required to select all the correct responses from among the choices.

Procedure

As for the procedure for the treatment, the control group experienced the convergent task-type technique whereby special attention was given to form tasks that demanded single-goal collaboration. However, the instructor in the experimental group introduced divergent tasks in which learners were expected to produce multiple solutions to a single problem. The tasks were designed based on the characteristics of convergence and divergence and the definitions of tasks given by Bygate *et al.* (2001) and Ellis (2003).

One pre-session was held to familiarize the subjects with the activity to be performed in each group in terms of cooperative learning and team work. Afterwards, each treatment session started with the pre-task stage activities that were basically similar for both groups and focused on removing the lexical and grammatical obstacles of the reading selection through some specific activities such as doing true/false, matching, and fill in the blank items. At the end of this stage, the subjects in both groups were well exposed to the vocabulary and grammar prerequisites of the reading passage. The on-task stage was the main part that differentiated the convergent and divergent task groups. In the former, tasks were designed in such a way that students were encouraged to collaborate in order to reach a single best answer while, in the latter, they were directed to create alternative ideas and implications.

As sample tasks, the students in the convergent group were asked to guess the topic of the reading passage, where one single possible topic was expected. Here, the students were encouraged to focus on particular phrases or words that would justify a correctly suggested topic. The divergent

group was, however, encouraged to come up with as many possible topics as they could think of. Unlike the situation in the convergent group, students were here encouraged to suggest various clues from the text to justify other possible topics. The students in the convergent group were guided to work together to come up with an outline of the text whereas those in the divergent group were asked to write a list of reasons why the text was well-organized or improperly-developed. Students in the convergent group were encouraged to present clues from the text by using sentences such as "the text says that ….", "there is a sentence here that shows …" whilst those in the divergent group were to use initiators such as "I feel ….", "I personally believe". Or students in the convergent group were asked to use the information from the given text and picture to compare and contrast the different models of the camera: size and portability, resolution, price, color, software, accessories, and user-friendliness and list the capabilities of each camera model whereas those in the divergent group were to use the information from the same picture to make decisions on the most suitable camera to video-record wildlife in rainforests or while scuba diving and to provide reasons for their decisions. Finally, each task would end with the post-task stage in which students discussed their experience, received positive comments to upgrade and improve their language and feedback on presenting accurate and appropriate language to the circumstances. Following the treatment, the developed reading comprehension test was administered to both groups to find the gains of reading ability in the groups in answering the four reading question types, i.e. simple factual, co-referential, inferential, and multiple-response items. Multivariate ANOVA (MANOVA) was used to find if there are any significant differences between and within the groups. Furthermore, a test of Homogeneity of Variances was used to ensure about the homogeneity of the two experimental and control groups in terms of their reading performance on the pre-test.

RESULTS

The results of the test of Homogeneity of Variances are shown in Table 1.

Table-1. Test of Homogeneity of Variances (pre-test)

Levene Statistic	df 1	df 2	Sig.
.896	3	89	.395

As shown in Table 1, the significance level confirms the homogeneity of variances in the following subgroups of the study; there was no significant difference between the two groups. The characteristics of each group are shown in Table 2.

Table-2. The characteristics of the subjects participating in each group

Control group (Convergent Task-type) (48 subjects)		Experimental group (Divergent Task-type) (45 subjects)	
23 Convergent Thinkers	25 Divergent Thinkers	21 Convergent Thinkers	24 Divergent Thinkers

The comparison of means among the parallel groups of the study is displayed in Tables 3 and 4.

Table-3. The result of reading comprehension post-test in the two task-type groups

Task	Mean	N
Convergent Task Group	81.1250	48
Divergent Task Group	88.2000	45
Total	84.5484	93

Table-4. The result of reading comprehension post-test in the two cognitive style groups

Style	Mean	N
Convergent Thinker	80.5455	44
Divergent Thinker	88.1429	49
Total	84.5484	93

As observed in Tables 3 and 4, the divergent task group outperformed the convergent one. Similarly, the divergent thinkers did better than the convergent thinkers of the study on the overall reading comprehension trest.

Table-5. The result of reading comprehension post-test in the four subgroups

TaskStyle	Mean	N
Convergent Task-Convergent Thinker	76.4783	23
Convergent Task-Divergent Thinker	85.4000	25
Divergent Task-Convergent Thinker	85.0000	21
Divergent Task-Divergent Thinker	91.0000	24
Total	84.5484	93

As Table 5 shows, divergent thinkers of the convergent task group performed similarly to convergent thinkers of the divergent task group while the other comparisons revealed differences of performance. The results of the Tukey test, as shown in Table 6, confirm the significance of these differences. To explore detailed differences among the four subgroups of the study, one-way ANOVA with the Tukey test was run as summarized in Table 6.

Table-6. Tukey HSD comparison of means in the overall reading comprehension post-test

(I) Task Style	(J) Task Style	Mean Difference (I-J)	Std. Error	Sig.
Convergent Task-Convergent Thinker	Convergent Task-Divergent Thinker	-8.92174*	.71938	.000
	Divergent Task-Convergent Thinker	-8.52174*	.75149	.000
	Divergent Task-Divergent Thinker	-14.52174*	.72653	.000
Convergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	8.92174*	.71938	.000
	Divergent Task-Convergent Thinker	.40000	.73701	.948
	Divergent Task-Divergent Thinker	-5.60000*	.71153	.000
Divergent Task-Convergent Thinker	Convergent Task-Convergent Thinker	8.52174*	.75149	.000
	Convergent Task-Divergent Thinker	-.40000	.73701	.948

	Divergent Task-Divergent Thinker	-6.00000*	.74398	.000
Divergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	14.52174*	.72653	.000
	Convergent Task-Divergent Thinker	5.60000*	.71153	.000
	Divergent Task-Convergent Thinker	6.00000*	.74398	.000

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

The acceptable significance level of .000<0.05 for the differences between the subgroups of the study shows that intra-group differences among convergent task learners on the one hand and divergent task learners on the other are significant. Meanwhile, the second and third rows of Table 6 show a significance level of .948>.05 for the differences between the subgroup convergent task-divergent thinkers and divergent task-convergent thinkers. Tables 3-6 illustrate the finding that divergent task type tailored to divergent thinkers provides the best results whereas convergent task type with convergent thinkers yields the poorest results. The results of the Multivariate Anova run on the results of the reading comprehension post-test with regard to test item type (factual, co-referential, inferential, and multiple-response) are presented in the Appendix. Table 7 presents a summary of the comparison of the means.

Table-7. Comparison of means in the detailed reading comprehension post-test

Task Style	Factual	Co-referential	Inferential	Multi-response
Convergent Task-Convergent Thinker	92.83	79.9565	72.6522	60.8261
Convergent Task-Divergent Thinker	94.84	86.6000	80.9600	79.2000
Divergent Task-Convergent Thinker	92.76	84.6190	83.2381	81.4762
Divergent Task-Divergent Thinker	92.92	91.9167	88.2500	90.9167
Total	93.38	85.8817	81.3011	78.1935

The first column of the table shows similarity of performance among the four subgroups of the study on factual comprehension while performance differences between divergent task –divergent thinkers on the one hand and convergent task–convergent thinkers on the other get gradually larger as we proceed from co-referential items through inferential ones and finally to multiple-response item types. In other words, multiple-response item types have the largest contribution to observed differences among the strongest and poorest subgroups. Inferential items scored the second, and co-referential ones the third.

DISCUSSION

There was an attempt in this study to determine the possible effects that the task type of convergence versus divergence and convergent versus divergent thinking (cognitive) style have on learners' reading comprehension gain in a course of study. The results can be classified into two main groups. Firstly, attention should be focused on differences among the subgroups of the study on the overall reading comprehension test. Secondly, we need to see how each subgroup performed

on each specific test item type. On the one hand, we had the experimental group (Divergent task type) versus the control group (convergent task type). As mentioned in the results section, the experimental group performed significantly better than the control group. According to Duff (1986) and based on the procedures of the study, in divergent tasks, the learners hold different viewpoints and have to discuss the issue with each other and justify their outlook. By contrast, in convergent tasks, students have to come into agreement with each other. In convergent tasks, learners are expected to converge on a single correct answer while in divergent tasks, a range of possible responses are encouraged. The results of the study showed that instruction through the divergent task type was more successful than that through the convergent type. On the other hand, we had divergent thinkers versus convergent thinker where the former's performance well exceeded that of the latter. Putting the results for all the subgroups of the study together, we find out that divergent thinkers of the divergent task group achieved significantly higher scores than all the others while convergent thinkers of the convergent group had the lowest performance among all the possible subgroups of the study.

On the second level of comparison, test item type performance differences were taken into account. All four subgroups performed similarly on factual reading comprehension test item types. However, when we proceed from co-referential through inferential to multiple-response items, differences grow gradually larger between the experimental and the control groups so that the multiple-response items create the largest differentiation between the two. This same pattern existed between the divergent thinkers of the divergent task group and convergent thinkers of the convergent task group. Here again, differences became larger with co-referential and inferential types and the largest with multiple-response items. Both on the general reading test and the detailed item types, the two subgroups of divergent thinkers of the convergent task group and the convergent thinkers of the divergent task group performed statistically similar.

A simple look at the above comparisons suggests that divergence is an advantage both as a task type and as a cognitive style. Moreover, results suggest that the ideal outcome was achieved when divergent thinkers are taught through divergent task type whereas the worst result is obtained when convergent thinkers receive instruction through convergent task type. A further result shows that a mixed situation in both cases results in a mediocre result. In other words, divergent thinkers of the convergent task type group and the convergent thinkers of the divergent task group performed statistically similar and received moderate scores.

CONCLUSION

It seems that materials developers, course designers, and test constructors should pay special attention to a balanced recipe in which neither of the two cognitive styles is placed at a disadvantage. It is recommended that they should make a balance between convergent task types

and divergent ones (Grabe and Stoller, 2002; Nuttall, 2005), between single-goal collaboration and multiple-outcome cooperative learning, between focusing on stated knowledge and requiring new significant knowledge, and between cognitively simple and demanding test items (Duff, 1986; Joe, 1998; Grabe and Stoller, 2002; Ellis, 2003), and between different test items (Pearson and Hamm, 2005; Young, 2005; Cutting and Scarborough, 2006; Fletcher, 2006). The findings of this study also contradict extreme views of those such as Duff (1986) and Getzels and Jackson (1962), believing that either convergence or divergence is linked with higher achievement and presents a more balanced one in which each cognitive type works best in certain situations. As for changes of divergent thinking as a result of instruction, the study is in line with the findings of the European Commission (2009) claiming that higher linguistic achievement is associated with higher divergent thinking score.

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Appendix

Tukey HSD for the Multivariate ANOVA on the reading post-test

Dependent Variable	(I) Task Style	(J) Task Style	Mean Difference (I-J)	Std. Error	Sig.
Factual	Convergent Task-Convergent Thinker	Convergent Task-Divergent Thinker	-2.01	.776	.053
		Divergent Task-Convergent Thinker	.06	.811	1.000
		Divergent Task-Divergent Thinker	-.09	.784	.999
	Convergent Task-Thinker	Convergent Task-Convergent Thinker	2.01	.776	.053
		Divergent Task-Convergent Thinker	2.08	.795	.051
		Divergent Task-Divergent Thinker	1.92	.768	.066
	Divergent Task-Convergent Thinker	Convergent Task-Convergent Thinker	-.06	.811	1.000
		Convergent Task-Divergent Thinker	-2.08	.795	.051
		Divergent Task-Divergent Thinker	-.15	.803	.997
	Divergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	.09	.784	.999
		Convergent Task-Divergent Thinker	-1.92	.768	.066
		Divergent Task-Convergent Thinker	.15	.803	.997
Co-referential	Convergent Task-Convergent Thinker	Convergent Task-Divergent Thinker	-6.6435*	.86610	.000
		Divergent Task-Convergent Thinker	-4.6625*	.90476	.000
		Divergent Task-Divergent Thinker	-11.9601*	.87470	.000
	Convergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	6.6435*	.86610	.000
		Divergent Task-Convergent Thinker	1.9810	.88732	.122
		Divergent Task-Divergent Thinker	-5.3167*	.85665	.000
	Divergent Task-Convergent Thinker	Convergent Task-Convergent Thinker	4.6625*	.90476	.000
		Convergent Task-Divergent Thinker	-1.9810	.88732	.122
		Divergent Task-Divergent Thinker	-7.2976*	.89572	.000
	Divergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	11.9601*	.87470	.000
		Convergent Task-Divergent Thinker	5.3167*	.85665	.000
		Divergent Task-Convergent Thinker	7.2976*	.89572	.000
Inferential	Convergent Task-Convergent Thinker	Convergent Task-Divergent Thinker	-8.3078*	.71595	.000
		Divergent Task-Convergent Thinker	-10.5859*	.74791	.000
		Divergent Task-Divergent Thinker	-15.5978*	.72306	.000
	Convergent Task-	Convergent Task-Convergent Thinker	8.3078*	.71595	.000
		Divergent Task-Convergent Thinker	-2.2781*	.73349	.013

	Divergent Thinker	Divergent Task-Divergent Thinker	-7.2900*	.70814	.000
	Divergent Task-Convergent Thinker	Convergent Task-Convergent Thinker	10.5859*	.74791	.000
		Convergent Task-Divergent Thinker	2.2781*	.73349	.013
		Divergent Task-Divergent Thinker	-5.0119*	.74043	.000
	Divergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	15.5978*	.72306	.000
		Convergent Task-Divergent Thinker	7.2900*	.70814	.000
		Divergent Task-Convergent Thinker	5.0119*	.74043	.000
Multi-response	Convergent Task-Convergent Thinker	Convergent Task-Divergent Thinker	-18.3739*	1.37728	.000
		Divergent Task-Convergent Thinker	-20.6501*	1.43876	.000
		Divergent Task-Divergent Thinker	-30.0906*	1.39096	.000
	Convergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	18.3739*	1.37728	.000
		Divergent Task-Convergent Thinker	-2.2762	1.41103	.377
		Divergent Task-Divergent Thinker	-11.7167*	1.36225	.000
	Divergent Task-Convergent Thinker	Convergent Task-Convergent Thinker	20.6501*	1.43876	.000
		Convergent Task-Divergent Thinker	2.2762	1.41103	.377
		Divergent Task-Divergent Thinker	-9.4405*	1.42438	.000
	Divergent Task-Divergent Thinker	Convergent Task-Convergent Thinker	30.0906*	1.39096	.000
		Convergent Task-Divergent Thinker	11.7167*	1.36225	.000
		Divergent Task-Convergent Thinker	9.4405*	1.42438	.000

*. The mean difference is significant at the .05 level.