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DOES COGNITIVE STYLE AFFECT PERFORMANCE ON ACCOUNTING EXAMINATION QUESTIONS?

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ABSTRACT

We investigate effects of cognitive style (field dependency) on performance on examination questions that differ in terms of contextual familiarity and degree of structure. We find that field independent students perform significantly better solving unfamiliar questions than do field dependent students, but possess no significant advantage over field dependent students when solving familiar questions, as supported by theory. For unstructured questions, we found no significant performance difference between field dependent and independent students, consistent with the inconclusive nature of current research findings. For structured questions, we found that field independent students performed significantly better than their field dependent counterparts. These results will help educators understand the role of cognitive style on students' ability to function in unfamiliar settings, which is one of the recommendations of the Accounting Education Change Commission.

Key words: Cognitive style, field dependence, performance, structured, familiar, examination.

Data availability: Data is available from the authors upon request.

INTRODUCTION

The reasons why some students perform better on different types of examination questions has long intrigued educators. Theories have been put forward to explain why some students will perform better on questions that are "directed" versus "undirected," "structured" versus "unstructured," or "familiar" versus "unfamiliar." In the present study, we are interested in how students perform when faced with accounting examination questions that differ not only in their degree of structure, but also in their context familiarity. By degree of structure, we mean the degree to which the task requirement(s) are spelt out in the question (where an unstructured question would require the student to identify the issues and steps necessary for the solution). By context familiarity, we mean whether the student is likely to recognize the specific accounting situation or not, given that the requisite skills to solve the problem had been taught previously. We investigate whether students' cognitive style affects their performance in examinations that include these question types. Cognitive style, which is examined more completely later, is the way individuals prefer to receive and process information, which in turn affects the way they conceptualize, store, and retrieve information.

Early attempts to illuminate these cognitive issues in an accounting setting can be found in the literature of the late 1970s and early 1980s. For example, Shute (1979) investigated student performance on CPA exam questions using a measure of "abstract reasoning" developed by Inhelder and Piaget (1958). He found that students having higher reasoning skills (classified as "formal-operational") performed better than those with lower reasoning skills (classified as "concrete-operational") when faced with both questions that required higher reasoning skills and those requiring more concrete (lower reasoning) skills. The terms formal- and concrete-operational were used by Inhelder and Piaget to describe the complexity of a person's cognitive structures. A concrete-operational person is oriented toward the relatively concrete realities of the world and is generally unable to consider abstract concepts that depart from that reality. Additionally, the ability to perform certain types of logical operations such as hypothesis reasoning, operations of propositional logic, and reasoning about contrary-to-fact situations, is limited in concrete-operational people. Those who have attained the highest level, called formal-operational, are able to understand concepts that depart from concrete reality, and reasoning is no longer limited to extrapolations from sensory experience. They are able to think of many different possibilities and think of what is observed as a special case of the possible (Inhelder and Piaget, 1958).

Further studies on cognition invoked the concept of cognitive complexity. Cognitive complexity is the term used by Harvey, et al. (1961); it holds that "all people may be ordered along

a continuum from concrete to abstract, depending on their ability to differentiate and integrate information" (Goldstein and Blackman, 1978, p.136). Amernic and Beechy (1984) found that accounting students of all levels of cognitive complexity performed equally well on highly structured accounting questions, but those students with high levels of cognitive complexity performed significantly better on unstructured examination questions. Jones and Davidson (1995) repeated Shute's 1979 work (referred to above) in a Canadian setting using the same abstract reasoning instrument. However, they avoided a significant problem, which was the paucity of formal examination questions on the CPA exam (93 percent were classed as concrete-operational). They obtained results comparable to those of Amernic and Beechy (1984) – all students, regardless of their reasoning level, performed equally well on questions not requiring a high degree of reasoning, but those with a higher level of formal reasoning ability performed significantly better than those with concrete-operational reasoning levels when faced with questions that required a higher level of analysis. Davidson (1996) also conducted an experiment on Canadian students sitting for the Uniform Final Examination (UFE) – the Canadian equivalent of the uniform CPA examination – using yet another test instrument, the ACCT[1] proposed by Chen and Olson (1989). His results confirmed the same pattern: candidates with higher levels of cognitive complexity achieved significantly higher grades on more unstructured questions than candidates with lower levels of cognitive complexity, but both groups achieved similar grades on more structured questions.

The consistency of these results using subjects from different universities, different countries, different test instruments and different techniques to measure problem-solving abilities is striking. Individuals with higher cognitive skills have an advantage when faced with solving problems that are unstructured, leading to the suggestion that the ability to function in unstructured situations is a function of an individual's cognitive skill. In addition, the ability to function in unfamiliar situations may also be a function of cognitive skill.

LEARNING APTITUDES

A great deal of research has focused on learner aptitudes in an attempt to understand how individuals approach and solve problems. This is an important topic for research, in that educators, professional bodies and government institutions all over the world have expressed concern that students must be increasingly able to tolerate higher levels of ambiguity, and be able to function in less-directed and more unstructured environments. For example, in 1989, the "Big 8" accounting firms contended that accountants were no longer being trained appropriately to meet the challenges

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[1]Chen and Olson's cognitive complexity test is an adaptation of the Bieri Rep Test (Bieri, 1965). It uses a Likert Scale to seek a subject's assessment of the reliability of figures in published financial statements (e.g. "The amount of "Receivables" reported in the audited balance sheet is Very Reliable …. Very Unreliable"). The rating on each question is compared to the remaining questions. A high score would indicate that the subject was circling approximately the same number on the Likert Scale for each response, which would suggest low differentiation and thus a low cognitive complexity level. Conversely, a low score would indicate a high degree of differentiation, and thus the subject would be considered relatively cognitively complex.

of advancing technology, proliferating regulations, globalization of commerce and complex business transactions (Arthur Andersen & Co. et al., 1989).

The call for change by major employers of accounting graduates focused the attention of many on the issue of understanding how individuals approach and solve problems. For example, Barbera (1996) proposes that management accountants should be able to analyze and use intuition and be creative, using their cognitive skills when solving problems. In the United Kingdom, the Dearing Report (1997) specifies a number of skills that students should possess, including "…cognitive skills, such as an understanding of methodologies or ability in critical analysis." In addition, Coombs et al. (2000) cautions educators that curricula must be taught in ways that emphasize a conceptual understanding as opposed to merely a technical one.

In Canada, many educators and professional accounting bodies have long argued for the use of "unstructured" materials in accounting courses. Rosen (1981) has been a particularly outspoken advocate of this approach, having written a number of textbooks on the use of relatively unstructured case materials. The Canadian Institute of Chartered Accountants (CICA, 1988) in articulating the educational problems facing the CA profession in Canada, notes that there is a failure to attract enough of 'the brightest and best who would have the necessary thinking skills beyond traditional structured problem-solving. Indeed, Strategic Proposal #6 (CICA, 1988) called for a broadening of the education and (university) entry requirements with the degree being widened to emphasize the development of thinking skills, interpersonal skills, and communication skills.

In the United States, the Accounting Education Change Commission (AECC) indicates in their Position Statement Number One (1990) that accounting graduates should possess specific communication, intellectual, and interpersonal skills essential to professional accountants. The AECC indicates that intellectual skills include the ability to "locate, obtain, and organize information" and the ability to "identify and solve unstructured problems in unfamiliar settings and to exercise judgment based on comprehension of an unfocused set of facts" (AECC, 1990. p. 307-308). These abilities are essential to accountants and auditors if they are to be able to work with complex and unstructured problems, and to meet the challenges identified earlier by the "Big 8" accounting firms (Arthur Andersen & Co. et al., 1989).

Cognitive Style

One learner aptitude of interest is cognitive style, which has been defined several ways. Chen and Macredie (2002) defines cognitive style as "an individual preferred and habitual approach to organizing and representing information." (p. 3) Alternatively, Pratt (1980) refers to it as "… the ways by which individuals receive, store, process and transmit information" (cited in Gul et al., 1992. p. 312).

A commonly used dimension of cognitive style is field dependence – independence. This dimension has the added advantage of being stable over time for individuals (Young and Eastman, 1981). Several measures of field dependence/independence have been employed over the years. For example, the Cognitive Styles Analysis (CSA) was developed by Riding (1991) and the Group

Embedded Figures Test (GEFT) was developed by Witkin et al. (1971). The approach by Witkin et al. (1971) has been criticized on the grounds that levels of field dependence are inferred from poor field independence performance (Ford and Chen, 2001). Nevertheless, the Witkin et al. field dependence model has been extensively studied, mainly because it focuses on how information comprehension is affected by the contextual field in which that information is contained (Weller et al., 1994). The GEFT is the measure we have used in this study for field dependency, and the rationale for its use is discussed next.

Field Dependency and Problem Solving

In nearly every situation in the literature, it has been found that field independent (FI) individuals (i.e. those who are more able than field dependent (FD) individuals to "disembed" a simple figure from a more complex one), perform better in problem solving situations where analytical and reasoning skills are required. The GEFT developed by Witkin et al. (1971) classifies subjects as being FI or FD depending on their ability to trace the outlines of simple figures that are embedded (and thus effectively hidden) in more complex geometrical shapes. In order to do this, the subject has to break up the organized field in order to expose the simpler figure contained therein. Those who find it relatively easy to overcome the complex field that dominates the picture are classed as field independent (FI), while those who have difficulty in separating the simple figure are labeled field dependent (FD). Thus the test is essentially one that measures visual perceptual differentiation – it deals with the methods by which subjects perform intellectual tasks rather than their intellectual ability (Messick, 1976).

Some researchers have argued that field dependence, particularly as measured by the embedded figures test, assesses cognitive or spatial ability rather than cognitive style: abilities are competencies whereas styles are modes of processing (Johnson et al. 2000). Others (e.g. Irvine and York, 1995) cite research indicating that field dependence/independence measures fail to predict academic achievement consistently, and that the instruments used often measure cognitive ability as much as they measure cognitive style (Zigler, 1963). This point is also raised in a slightly different way by Davis (1991) who argues that field dependence is both ability and style as "field dependence sometimes acts as an ability and sometimes as a style, which is one of its intriguing features" (p. 165). For example, Davis (1991) argues that field dependence tests are tests of ability (e.g. Witkin et al., 1977; Witkin and Goodenough, 1981), and are also correlated with other ability tests (e.g. Cooperman, 1980; Guilford, 1980). Supporting a style perspective, Davis suggests: "[e]vidence regarding stylistic characteristics comes from studies that identify an individual's preference for methods of approaching different tasks and situations" (p. 164). While the theory and construct of learning styles is still a matter of debate, the important point to be made is that any distinction between style and ability is not critical for the present study. We are interested in whether field dependence can be used to predict student performance on examination questions that differ in their familiarity and structure.

Differences in field dependency have been shown to extend to a wide range of intellectual domains. In a nonaccounting setting, Frank and Noble (1984) found that FI students solve anagrams more quickly than FD students, and that FD individuals perceived anagrams to be more difficult than their FI counterparts. Witkin and Goodenough (1977) report that FD individuals are more receptive than FI individuals to ambiguous information and situations. In an accounting situation, Gul (1984) showed that FD individuals are more confident than FI students in judgments when faced with ambiguous information. Lusk (1973) found that FI individuals demonstrated higher cognitive skills in analyzing annual reports. Nevertheless, there is also a body of research that suggests that there may be other factors at work. Davis and Cochran (1989) argue that where the quantity of information to be processed is small, there is little difference in performance between FI and FD subjects, "however, when larger amounts of information must be analyzed or integrated, then the performance of field-independent individuals is more accurate and efficient" (p. 37). Further, it has been shown that FI individuals exhibit greater analytical skills than FD individuals (Bernardi, 2003), and Davis and Cochran (1989) also indicate that research generally shows that "field-independent students reflect higher levels of achievement than field-dependent students do" (p. 41). Indeed, contrary to the results found by Witkin and Goodenough (1977) and Gul (1984), Neimark (1981) argues that field dependent individuals lack skills for dealing with unstructured tasks and ambiguous instructions.

These findings suggest that individuals who are field dependent will have their perceptions and information processing affected by the contextual field in which they are operating: field dependents rely on external frames of reference while field independents rely on internal frames of reference. This is consistent with Witkin et al. (1977), who found that field dependent individuals tend to perceive objects as a whole, whereas field independent individuals focus on each part of the object. In other words, field dependent individuals typically see the global picture and approach a task more holistically; field independent individuals tend to discern figures as being discrete from their background, to focus on details, and to be more analytic in their approach to learning.

HYPOTHESIS DEVELOPMENT AND RESEARCH DESIGN

Based on prior research, we posit that cognitive style is a factor in student performance on examination questions. First, we consider the general case of field dependency on examination performance, regardless of the nature of the questions. By this, we mean how field dependency affects aggregate performance over a broad range of question types, as one might find in a typical exam. Then we consider the impact of field dependency on the specific type of question, i.e. the degree of familiarity and structure. This first hypothesis follows from the work of Benardi (1993), Davis and Cochran (1989), and Jones and Wright (2010), whose research strongly support the hypothesis that FI students in general will outperform FD students – in other words, the level of achievement for FI students is higher. Thus $\mathbf{H_1}$ is stated in a directional alternative form as we specify a directional hypothesis based on the literature.

H_1: Field independent students perform better than field dependent students when solving all questions regardless of their degree of structure and familiarity.

Next, we consider the degree of familiarity in the accounting examination questions. As described earlier, an unfamiliar question would be one in which the question's context has not been seen before, even though the individual has been taught the necessary tools to analyze it. In a familiar question, the individual would have less difficulty in applying the correct analytical tools. Specifically, we expect that students who are classed as field independent (FI) would perform better on unfamiliar-context questions ("unfamiliar questions") than field dependent students (FD). This follows from the work of Jones and Wright (2010), Karp (1963), and Fenchel (1958, as referenced in Witkin et al., 1971), all of whom reported that FIs perform significantly better than FDs when faced with problems that require the isolation of a critical element in a context different from the one in which it has been presented. This leads to **H_2**, which is also stated in a directional alternative form as we specify a direction.

H_2: Field independent students perform better than field dependent students when solving unfamiliar questions.

However, when the situation is familiar, FI students have no special advantage over FD students (because with familiar questions, the context is the same as what has been previously covered). As a result, the FI's superior ability to isolate a critical element in a different context no longer applies (Fenchel, 1958). Therefore, we argue that there should be no effect of field dependence on familiar questions. **H_3** is stated in the null form because we posit no difference (and therefore no direction).

H_3: Field independent students do not perform better than field dependent students when solving familiar questions.

Next, we consider the degree of structure in the accounting examination questions – since the inability of many students to function in unstructured environments is one of the AECC's criticisms mentioned earlier. Unstructured questions tend to be unfocused: usually the student is required to identify the problem(s) and rank them, and may be forced to make assumptions. Consequently, more than one solution is generally available with these kinds of questions, and as a result, there is considerable ambiguity associated with them. Unfortunately, as discussed above, the extant literature on field dependency does not provide a clear theoretical position on how, if at all, FI and FD subjects should differ in performance when faced with questions that present varying degrees of structure. Accordingly, we are unable, ex ante, to posit a difference for either unstructured or structured questions. Because we don't know which effects in the literature might dominate or indeed might cancel each other out, we cannot offer directional hypotheses for either

unstructured or structured questions. Nevertheless, the effect of field dependence might well be different for unstructured questions and for structured questions, and accordingly, the two types of questions must be tested separately. We state our hypotheses below in the null form because we do not posit any effect of field dependence on unstructured questions and we do not posit any effect of field dependence on structured questions. $\mathbf{H_4}$ and $\mathbf{H_5}$ are[2]:

H_4: Field independent students do not perform better than field dependent students when solving unstructured questions.

H_5: Field independent students do not perform better than field dependent students when solving structured questions.

EXPERIMENTAL DESIGN

The first step in the research design was the selection of accounting questions that can be classified as either structured or unstructured and classified as either familiar or unfamiliar. A large sample of questions from throughout the curriculum in the first intermediate financial accounting courses was initially selected. The researchers were careful to select only those questions that tested course material previously covered in the intermediate course being taught. These questions were judged by both researchers to be clearly at one end of the continuum or the other for each dimension. Questions that were judged to be "neutral" with respect to structure or familiarity were not selected. A question was labeled as **structured** if the "required" answer was clearly stated, or if a set of steps required for the solution was provided. A question would be labeled **unstructured** if the answer required the student to make assumptions or if no clear approach to solving the problem was given – such as when a question simply stated "write the report to management," for example. Questions were deemed **familiar** if the situation in which the problem was framed was easily recognized, regardless of whether the students were familiar with the accounting tools needed to solve the problem. Conversely, if students could not be expected to have experienced a given situation (even though they "knew" enough accounting to solve the problem), the question was deemed **unfamiliar**.

These questions were then pilot tested with volunteer students from the previous year's intermediate accounting class. The students were provided with the questions and an explanation sheet that explained what "structured/unstructured" and "familiar/unfamiliar" meant. They then were asked to categorize each question on a seven-point Likert scale for structure and a seven-point Likert scale for familiarity. The students were not asked to answer or solve the accounting questions. A subset of questions, in which the student classifications were the same as the researchers (who exercised judgment rather than using cut-offs on a Likert scale to assess the category to which each

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[2]It should be noted that we are examining the effect of field dependence *within* the unfamiliar questions and separately the effect of field dependence *within* familiar questions, as well as separately structured and unstructured questions, hence the need for four separate hypotheses and for four separate statistical analyses. At this point, we are not examining the difference in performance *between* unfamiliar and familiar questions, nor are we examining the difference *between* structured and unstructured questions.

question clearly belonged), was used for the study. These questions were then included in quizzes, the midterm examination and the final examination, along with other questions appropriate for pedagogic reasons, but not included in the research study. Since any particular question could be structured or unstructured as well as familiar or unfamiliar, it was important to pick questions in such a way that a representative sample of all four question types was achieved. The Appendix contains one of each of the four question types that were used in the study: structured/familiar, structured/unfamiliar, unstructured/familiar, and unstructured/unfamiliar.

To ensure that the questions of interest to the study were graded independently of the researchers, and thus would not bias the results, a research assistant (a senior graduating student) marked every question used in the study. In total, 160 students in four sections of intermediate financial accounting, over two semesters, participated in the study. The two instructors for the course, who were also the researchers, used identical overhead notes to teach the material. The content of the quizzes, mid-terms and final exams was identical across all participants.[3]

The hypotheses examine performance on four different types of questions: familiar, unfamiliar, structured and unstructured. It should be noted that in fact each question has two characteristics: degree of familiarity and degree of structure. This resulted in four combinations of questions: familiar/structured; familiar/unstructured; unfamiliar/structured and unfamiliar/unstructured. However, in order to test H_2, for example, we needed questions that are just unfamiliar rather than one of those four combinations. To derive the unfamiliar questions, it was necessary to combine the unfamiliar/structured questions and the unfamiliar/unstructured questions by calculating a weighted average of the marks. To test H_3-H_5, this process was repeated to derive the familiar questions (using the weighted average of the familiar/structured questions and the familiar/unstructured questions), the structured questions (using the weighted average of the familiar/structured questions and the unfamiliar/structured questions) and the unstructured questions (using the weighted average of the familiar/unstructured questions and the unfamiliar/unstructured questions). To test H_1, the average of all four types of questions was used.

The hypotheses all consider the effect of field independence on performance, and in each case were tested using regression analysis. The instrument was administered at the beginning of each semester to those students who agreed to participate in the study. Students' degree of field independence was measured by their score on the GEFT instrument. The test instrument, which is composed of two sections, is time-limited, and was scored on a continuous basis (rather than by using a median cut-off). The researchers scored the completed instruments using the accompanying marking guide. The range of possible scores is between zero and 18, with higher scores indicating higher degrees of field independence, and lower scores indicating higher degrees of field dependence. In conducting the analysis the effect of age, gender and student ability, as measured

[3]There was the possibility that a student could drop out of a fall class and repeat it in the winter. In actual fact, only two students did this, and both had dropped before the mid-term exam; consequently they had been exposed to only two of the four quizzes. Nevertheless, they were not included in the analysis.

TABLE 1
Descriptive Statistics

Panel A

GPA (avg.)	3.18
GEFT - mean	12.20
Std. deviation	4.846
% MALE	51.00
AGE - mean	22.41
Median	22.0

GPA The cumulative grade point average in the semester prior to the intermediate financial accounting course (maximum 4.00).
GEFT The score out of 18 on the Group Embedded Figures Test.
% MALE The percentage of male students in the treatment group.
AGE The average and median age of the subjects in years.

Panel B

Marks for each question type

	Structured	Unstructured	TOTAL
Familiar	68.90 (3)*	45.06 (3)*	56.98 (6)*
Unfamiliar	52.05 (5)*	39.76 (4)*	45.90 (9)*
TOTAL	60.47 (8)*	42.41 (7)*	49.74 (15)*

* The number in parentheses is the number of questions used in each category.

by their incoming grade point average (GPA), needed to be controlled and accordingly the data was collected by the undergraduate office.

RESULTS

Descriptive statistics are provided in Table 1. As shown in Panel A, the students are almost evenly split in terms of gender, have an average GPA above 3.0 (a "B" letter grade at this institution), have an average GEFT of 12.20 (standard deviation 4.846), and have an average age of 22.41 (median 22). The average out of 100 for each type of question is listed in Table 1, Panel B, along with the number of questions used for each type. Although a comparison in performance

TABLE 2

Correlation Matrix (all Pearson except for Gender which is Spearman)

	GPA	GEFT	Fam	Unfam	Struc	Unstruc	SUM	GENDER
AGE	-.101	-.063	.007	-.003	-.013	.018	-.003	-.235**
	.181	.405	.931	.971	.860	.806	.971	.002
GPA		-0.032	.511**	.487**	.481**	.494**	.557**	.210**
		.667	.000	.000	.000	.000	.000	.005
GEFT			.069	.120	.144*	.055	.120	-.097
			.360	.109	.054	.466	.109	.198
Fam				.568**	.777**	.736**	.821**	.022
				.000	.000	.000	.000	.767
Unfam					.702**	.846**	.935**	.004
					.000	.000	.000	.953
Struc						.500**	.838**	.011
						.000	.000	.887
Unstruc							.884**	.009
							.000	.906
SUM								.024
								.751

NOTE: Significance figures are shown underneath correlation figures
* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

AGE	The age in years
GPA	The cumulative grade point average in the semester prior to the intermediate financial accounting course (maximum 4.00)
GEFT	The score (out of 18) on the Group Embedded Figures Test
Fam	The weighted average mark (out of 100) on the familiar questions
Unfam	The weighted average mark (out of 100) on the unfamiliar questions
Struc	The weighted average mark (out of 100) on the structured questions
Unstruc	The weighted average mark (out of 100) on the unstructured questions
SUM	The average mark (out of 100) on all the questions
GENDER	Coded 0 (Male) and 1 (Female)

by question type is not the focus of our study, we provide this information for the interest of the reader. The highest average is for the structured questions (60.47) and the lowest average is for the unstructured questions (42.41), as shown in Table 1. The values for familiar (56.98) and unfamiliar (45.90) questions are between structured and unstructured questions. Simple t-tests of the differences among all six possible pair-wise comparisons revealed that the differences are significant ($p = 0.000$). Clearly, students had the greatest difficulty with unstructured questions. The total average across all four types of questions is 50.74[4].

Table 2 provides the correlation matrix for the dependent and independent variables. An examination of the correlation matrix reveals that, unsurprisingly, all four question types and their sum (the dependent variables) are highly correlated with each other. Importantly, GEFT (the independent variable) and GPA (the control variable) are not correlated with each other and,

TABLE 3

Regression Model fo Dependent Variable: SUM

R^2	0.345
Adjusted R^2	0.330
Model F	22.904
Significance	0.000

	Unstandardized Beta	Std. Error	T	Significance
Constant	-19.084	11.343	-1.682	0.094
AGE	0.276	0.374	0.738	0.462
GEFT	0.346	0.160	2.156	0.016*
GPA	19.107	2.039	9.368	0.000
GENDER	-2.743	1.601	-1.713	0.088

* one-tailed test

Regression model:

$$Y_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEFT_i + \beta_3 GPA_i + \beta_4 GENDER_i + e_i$$

Where Y_i =	SUM (average mark (out of 100) on the sum of all questions for i^{th} student).
AGE_i	The age in years
$GEFT_i$	The score (out of 18) on the Group Embedded Figures Test for i^{th} student.
GPA_i	The cumulative grade point average in the semester prior to taking the intermediate financial accounting course (maximum 4.00) for i^{th} student.
$GENDER_i$	Coded 0 (Male) and 1 (Female) for i^{th} student.
e_i	Error term.

[4]The actual student performance in the intermediate financial accounting course was higher than indicated by these scores, as the quizzes, midterm and final exam had other questions that were not included in the study. These other questions were necessary to create exams of the usual length and rigor. They were not included in the study due to a lack of agreement as to their classification.

therefore, both can be included in the analysis without violating statistical assumptions, while GENDER is correlated with AGE and GPA (but the correlation coefficients are less than the usual cut-offs[5]). To test H_1, we examined the total marks across all types of questions and hypothesized that the field independent students would perform better than the field dependent students. We tested this using the average mark on all the questions as the dependent variable, GEFT as the independent variable, and AGE, GPA and GENDER as the control variables. The results shown in Table 3 for GEFT indicate that we can reject the null of no difference between field independent students and field dependent students. The positive and significant coefficient ($p = 0.016$, one-tailed) suggests that field independent students generally perform better on all questions combined. Table 3 also indicates that GPA is positive and significant ($p = 0.000$). GENDER and AGE were not significant.

TABLE 4

Regression Model fo Dependent Variable: UNFAMILIAR

R^2	0.272
Adjusted R^2	0.255
Model F	16.233
Significance	0.000

	Unstandardized Beta	Std. Error	T	Significance
Constant	-28.112	143.264	-1.971	0.050
AGE	0.308	0.471	0.655	0.513
GEFT	0.404	0.202	2.002	0.023*
GPA	20.095	2.565	7.836	0.000
GENDER	-3.493	2.014	-1.735	0.085

* one-tailed test

Regression model:

$$Y_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEFT_i + \beta_3 GPA_i + \beta_4 GENDER_i + e_i$$

Where Y_i =	UNFAMILIAR (weighted average mark (out of 100) on the unfamiliar questions for i^{th} student).
AGE_i	The age in years
$GEFT_i$	The score (out of 18) on the Group Embedded Figures Test for i^{th} student.
GPA_i	The cumulative grade point average in the semester prior to taking the intermediate financial accounting course (maximum 4.00) for i^{th} student.
$GENDER_i$	Coded 0 (Male) and 1 (Female) for i^{th} student.
e_i	Error term.

[5]According to Hinkle et al. (2003, p. 109), a correlation between 0.00 and 0.30 is "little, if any correlation."

The analysis for H_2 was conducted using the average mark on the unfamiliar questions as the dependent variable, GEFT as the independent variable, and AGE, GPA and GENDER as control variables. The results are presented in Table 4. The expectation was that FI students would perform better than FD students and this is supported by the analysis. The beta coefficient for GEFT is significant (p = 0.023, one-tailed) and positive – indicating that students who are more field independent perform better on unfamiliar questions. The beta coefficient for the GPA control variable is also significant (p = 0.000) and positive, as one would expect. The coefficients for AGE and GENDER are not significant.

The performance on the familiar questions is the object of H_3. The expectation regarding performance on the familiar questions was that there would be no difference for those students who are field independent versus those who are field dependent. This was tested using the average mark on the familiar questions as the dependent variable, GEFT as the independent variable, and AGE, GPA and GENDER as control variables. The results are presented in Table 5. The expectation is supported by the analysis as the beta coefficient for GEFT is not significant (p = 0.198). The GPA

TABLE 5

Regression Model fo Dependent Variable: FAMILIAR

R^2	0.277
Adjusted R^2	0.261
Model F	16.689
Significance	0.000

	Unstandardized Beta	Std. Error	T	Significance
Constant	-9.844	12.427	-0.792	0.429
AGE	0.335	0.410	0.816	0.415
GEFT	0.227	0.176	1.293	0.198
GPA	18.054	2.234	8.080	0.000
GENDER	-1.798	1.754	-1.025	0.307

Regression model:

$Y_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEFT_i + \beta_3 GPA_i + \beta_4 GENDER_i + e_i$

Where Y_i =	FAMILIAR (weighted average mark (out of 100) on the familiar questions for i^{th} student).
AGE_i	The age in years
$GEFT_i$	The score (out of 18) on the Group Embedded Figures Test for i^{th} student.
GPA_i	The cumulative grade point average in the semester prior to taking the intermediate financial accounting course (maximum 4.00) for i^{th} student.
$GENDER_i$	Coded 0 (Male) and 1 (Female) for i^{th} student.
e_i	Error term.

control variable is again significant (p = 0.000) and positive, while AGE and GENDER are again not significant.

H_4 considered the examination questions which are unstructured. We tested this hypothesis using the average mark on the unstructured questions as the dependent variable. GEFT was again the independent variable, and AGE, GPA and GENDER were again control variables. The results are presented in Table 6. We were not able to hypothesize a direction for the effect of GEFT, as the literature seemed to be divided on whether being field independent or being field dependent would confer an advantage for unstructured questions. The results indicate a non-significant beta coefficient for GEFT (p = 0.296) and, hence, we cannot reject the null hypothesis of no difference based on field independence. The GPA control variable is significant (p = 0.000) and positive and AGE and GENDER are not significant.

The performance on structured examination questions were considered in H_5. The expectation was similar to that for the unstructured questions; that is, we were not able to hypothesize a difference for the effect of GEFT given the findings in the literature. H_5 was tested using the average mark on the structured questions as the dependent variable, GEFT as the

TABLE 6

Regression Model fo Dependent Variable: UNSTRUCTURED

R^2	0.260
Adjusted R^2	0.243
Model F	15.307
Significance	0.000

	Unstandardized Beta	Std. Error	T	Significance
Constant	-37.483	15.314	-0.448	0.015
AGE	0.464	0.506	0.917	0.360
GEFT	0.227	0.217	1.049	0.296
GPA	21.383	2.753	7.766	0.000
GENDER	-2.605	2.162	-1.205	0.230

Regression model:

$Y_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEFT_i + \beta_3 GPA_i + \beta_4 GENDER_i + e_i$

Where Y_i =	UNSTRUCTURED (weighted average mark (out of 100) on the unstructured questions for i^{th} student).
AGE_i	The age in years
$GEFT_i$	The score (out of 18) on the Group Embedded Figures Test for i^{th} student.
GPA_i	The cumulative grade point average in the semester prior to taking the intermediate financial accounting course (maximum 4.00) for i^{th} student.
$GENDER_i$	Coded 0 (Male) and 1 (Female) for i^{th} student.
e_i	Error term.

TABLE 7

Regression Model fo Dependent Variable: STRUCTURED

R^2	0.269
Adjusted R^2	0.253
Model F	16.041
Significance	0.000

	Unstandardized Beta	Std. Error	T	Significance
Constant	-0.476	12.117	-0.039	0.969
AGE	0.180	0.400	0.449	0.654
GEFT	0.404	0.171	2.358	0.020
GPA	16.764	2.179	7.695	0.000
GENDER	-2.685	1.711	-1.570	0.118

Regression model:

$Y_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEFT_i + \beta_3 GPA_i + \beta_4 GENDER_i + e_i$

Where Y_i =	STRUCTURED (weighted average mark (out of 100) on the structured questions for i^{th} student).
AGE_i	The age in years
$GEFT_i$	The score (out of 18) on the Group Embedded Figures Test for i^{th} student.
GPA_i	The cumulative grade point average in the semester prior to taking the intermediate financial accounting course (maximum 4.00) for i^{th} student.
$GENDER_i$	Coded 0 (Male) and 1 (Female) for i^{th} student.
e_i	Error term.

independent variable, with AGE, GPA and GENDER as the control variables. From Table 7, it can be seen that in fact the beta coefficient for GEFT is statistically significant ($p = 0.020$) and positive, as is the control variable for GPA ($p = 0.000$). The AGE and GENDER control variables are not significant. The result for GEFT indicates that field independent students have an advantage over field dependent students in structured questions. This result is surprising as one might argue that structured questions should be less challenging compared to unstructured (as was the case given the marks shown in Table 1) and, therefore, being field independent should not provide a significant benefit.

CONCLUSION

This study has added to the literature by investigating directly the relationship between students' cognitive style and their ability to handle examination questions that differ in terms of familiarity and degree of structure. As predicted by theory, when we look at the aggregate question marks – that is, without regard to their degree of structure or familiarity – we reject the null for H_1. That is, FI students demonstrate a higher ability overall than FD students in answering all questions.

In examining specific question types, we found that field independent students performed significantly better than field dependent students on questions whose context was unfamiliar, while there was no significant difference between the two types of student on questions that had a familiar setting, again as predicted by theory. That is, being field independent offers no significant advantage when the task assigned is framed in a recognized context, but offers a clear advantage when the task is framed in an unrecognized one. Given that the AECC and various other accounting bodies stress that educators should be preparing students so that they can function in unfamiliar settings, this research provides some important insights into this desirable characteristic.

We were unable to predict ex ante how students' cognitive styles would affect the performance on structured and unstructured questions. We observe that the literature is inconclusive, and it is possible that factors other than cognitive style are important when solving these types of questions. Our research result for the unstructured questions is consistent with the inconclusive nature of the literature. The more surprising result (because we would have expected no difference) was that for the structured questions, field independent students performed better than field dependent students. It might be, however, that the structured questions used in the study tend to have large amounts of information that must be integrated (albeit structured information) and would, according to Davis and Cochran (1989), provide a disadvantage to the field dependent students. Additionally, there is the possibility that the structured questions – which combine familiar and unfamiliar elements – are not differentially challenging for either FI or FD students (because they are structured); thus the driving factor becomes the familiar-unfamiliar component, where, as the results show, the FI students would be expected to dominate.

There are some implications for accounting educators that stem from these findings. Consistent with other research, this study finds that field independent students demonstrate greater skills in handling unfamiliar situations. Nevertheless, it would be inappropriate to argue that there is no place for field dependent students in accounting, as both types "bring something to the table." As the AECC has stated, "To become successful professionals, accounting graduates must possess communication skills, intellectual skills, and interpersonal skills" (AECC 1990. p. 307), and Witkin et al. (1977) has noted that field dependent individuals tend to have higher interpersonal skills than field independent individuals. In an ideal world, students could be identified as being predominately field dependent or field independent and then be given instruction appropriate for their particular learning style. Such a course of action, however, would be economically infeasible given the financial situation of most institutes of higher learning. Perhaps the clearest message to deliver is that instructors should become aware that students in accounting classes exhibit different learning styles, and therefore each should have an opportunity to answer examination questions that capture their particular talent.

As with nearly all experimental research, there are limitations. The results are based on just one study and at one university, and thus may not be reproducible in a different setting. Further, the study depends on the accurate categorization of the questions into the four types – familiar, unfamiliar, structured and unstructured. There may be other factors affecting performance on the examination questions that have been omitted from the study. An entirely different classification

scheme of the examination questions might have yielded different results. Future research is necessary to explore the structured and, especially, the unstructured examination questions and what is driving the different results for field independent students. Other measures of cognitive style such as the Cognitive Styles Analysis (Riding, 1991) or ACCT (Chen and Olson, 1989) should be used to determine if they affect performance on these types of examination questions. Finally, research using other classification schemes of examination questions should be conducted.

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APPENDIX[6]

A sample of actual questions used in the research is reproduced below along with its source reference. One question from each category is provided. The four categories are: Structured/Familiar; Structured /Unfamiliar; Unstructured /Familiar; and Unstructured/Unfamiliar.

Structured/Familiar Question (E3-21, Kieso et al., 2007, p. 121).
Financial information is presented below for four different companies.

	Pamela's Cosmetics Inc.	Dean's Grocery Inc.	Anderson Wholesalers Ltd.	Baywatch Supply Ltd.
Sales	$78,000	(c)	$144,000	$100,000
Sales returns	(a)	$5,000	12,000	9,000
Net sales	74,000	94,000	132,000	(g)
Beginning inventory	16,000	(d)	44,000	24,000
Purchases	88,000	100,000	(e)	85,000
Purchase returns	6,000	10,000	8,000	(h)
Ending inventory	(b)	48,000	30,000	28,000
Cost of goods sold	64,000	72,000	(f)	72,000
Gross profit	10,000	22,000	18,000	(i)

Instructions
Determine the missing amounts for (a) to (i). Show all calculations.

Structured/Unfamiliar Question (WA1-2 Kieso et al., 2007, p. 26).
Some accountants have said that politicization in the development and acceptance of generally accepted accounting principles (i.e. standard setting) is taking place. Some use the term "politicization" in a narrow sense to mean the influence by governmental agencies, particularly the securities commissions, on the development of generally accepted accounting principles. Others use it more broadly to mean the compromise that results when the bodies responsible for developing generally accepted accounting principles are pressured by interest groups (securities commissions, stock exchanges, businesses through their various organizations, financial analysts, bankers, lawyers, etc.).

Instructions

(a) What arguments can be raised to support the politicization of accounting standard setting?

(b) What arguments can be raised against the politicization of accounting standard setting?

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Unstructured/Familiar Question (created by the authors)
Explain the differences between the cash flow basis of accounting and the accrual basis of accounting and why accrual accounting is used.

Unstructured/Unfamiliar Question (CA5-2, Kieso et al., 2007, p. 283).
In the late 1990's, CIBC helped Enron structure 34 "loans" that appeared as cash proceeds from sales of assets in the financial statements. Enron subsequently went bankrupt in 2001 and in its wake, left many unhappy investors and creditors who had lost billions of dollars. In December 2003, CIBC settled four regulatory investigations with the SEC, U.S. Federal Reserve, the U.S. Justice Department and the Canadian Office of the Superintendent of Financial Institutions. The settlement, which amounted to $80 million U.S., is one of the largest regulatory penalties levied on a Canadian bank. The regulatory authorities felt that CIBC had aided Enron in boosting its earnings and hiding debt. CIBC set aside a $109 million reserve in early 2003 in anticipation of this settlement. No additional reserves will be set aside.

As part of the settlement, CIBC agreed to get rid of its structured financing line of business (where all of these "loans" were created). Bank management noted that the decision to get rid of the structured financing business would reduce annual earnings by 10 cents a share. The bank had previously reported annual earnings of $5.21 per share. In addition, the bank must accept the appointment of an outside monitor who will, amongst other things, review the bank's compliance with the settlement. Strategically, the bank had already reduced its emphasis on corporate lending (having suffered heavy losses in 2002) in favour of increased focus on earnings from branch banking operations.

CIBC is still owed $213 million from Enron. There are many additional Enron-related lawsuits pending against the bank which has stated that the lawsuits are without merit. The bank has insurance against many of these claims and plans to vigorously defend itself.

Instructions
Adopt the role of the company's auditors and discuss any financial reporting issues.