

COGNITIVE STYLES OF EXPERIENCED AUDITORS IN THE NETHERLANDS

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Cognitive styles of decision makers have been studied by a number of researchers over a period of years. Previous research has investigated cognitive styles in relation to information systems design and decision-making variables generally. Studies of cognitive styles in relation to auditor specific decision-making variables have been less common.

This paper investigates cognitive styles of practicing auditors in The Netherlands using two well-known psychometric instruments: the Myers-Briggs Type Indicator (MBTI) and the MacDonald AT-20 Tolerance for Ambiguity instrument (AT-20). The AT-20 has been used previously to investigate auditor individual differences in cognitive styles in relation to audit decision-making tasks (Pincus 1990). The MBTI has not been previously used to investigate auditor cognitive styles. The study described in this paper involved subjects from three auditing firms in The Netherlands. Subjects were presented with an audit case and asked to come to a decision about materiality. Information in the form of financial statements and other financial information was presented to the subjects via a computer program. The subjects selected the information they wanted to view by choosing an item on a menu. The sequence in which they selected information and the amount of time expended in viewing each page of information were recorded by the computer program. After the subjects finished the case, they were asked to complete the two cognitive style instruments (i.e. MBTI and AT-20).

Results indicate that there is a preference for Sensing among subjects as measured by the MBTI. This finding is consistent with previous research using the MBTI which indicates that accountants and auditors generally have a preference for the Sensing type of information acquisition. Some differences between auditing firms were observed in regard to cognitive styles and information search variables.

This study investigates auditor cognitive styles and the relationship between cognitive styles and certain auditor decision variables. The paper is organized into four sections as follows: Review of Previous

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Literature; Summary of the Research Methodology; Data Presentation and Analysis; and Conclusions and Limitations.

REVIEW OF PREVIOUS LITERATURE

Research Rationale

A financial statement audit can be described as a process through which the financial records of an entity are examined to the extent necessary for the auditor to form an opinion regarding the fairness of the presentation of the financial statements in accordance with generally accepted accounting principles. The audit process involves a sequence of tasks performed in relation to a specific goal. The audit consists generally of three phases: Planning the Audit, Accumulating Evidence, and Evaluating the Audit Evidence. The manner in which the auditor follows these steps is subjectively determined. The education and training of auditors are intended to ensure competence, however, education and training are not in and of themselves sufficient to ensure an effective and efficient audit. Audit judgment is subject to differences in the cognitive styles of auditors. This paper attempts to investigate auditor cognitive styles and the relationship between cognitive style variables and certain auditor decision variables.

Review of Previous Research

Previous research has investigated the relationship between cognitive styles and decision-making behavior (e.g. Mock *et al.* 1972; Lusk 1973, 1979; Dermer 1973; Benbasat & Dexter 1979; Pincus 1990). Lusk (1979) investigated the interaction between cognitive styles and information stimuli in relation to the development of individualized information systems. Subjects were undergraduate students. Two groups were formed: high analytics and low analytics. Both groups were presented with either a report of high complexity or a report of low complexity. It was found that the high analytics outperformed the low analytics and that the groups that received the less complex reports significantly outperformed the groups that received the more complex reports. However, the interaction effects (i.e. whether high analytics outperformed low analytics on the more complex reports and the low analytics outperformed the high analytics on the less complex reports) were not significant.

Benbasat & Dexter (1979) also investigated the relationship between cognitive styles and information stimuli. Subjects were undergraduate students, faculty members and professional accountants. The subjects were subdivided into two groups: high and low analytics, using the

same test instrument as Lusk (1979). Each group was sub-divided whereby the first half received aggregated, structured information and the second half received the same information in an unaggregated database format. It was found that high analytics significantly outperformed low analytics. The degree of aggregation did not have a significant impact on the decisions. However, a significant interaction between structuredness of information and cognitive style was present: the high analytics outperformed the low analytics on the structured information reports, and the low analytics outperformed the high analytics on the unstructured (i.e. database) information.

Pincus (1990) investigated individual differences in cognitive styles in relation to certain auditor decision variables. Pincus quotes Gibbins & Mason (1988, p. 18) as follows: 'Considering people as part of the (decision) process is obvious: judgment is a human process, with logical, psychological, social, legal and even political overtones'. Pincus points out that little empirical evidence concerning the relation of cognitive styles and auditor decision-making processes exists. In her study, Pincus used three cognitive style instruments (i.e. Group Embedded Figures Test of field dependence-independence, Pettigrew's CW-Scale for category width, and MacDonald's AT-20 for ambiguity tolerance-intolerance) to investigate whether auditors who differ in cognitive style reach different conclusions in an audit decision-making task (Pincus 1990). She found that auditors who were field independent in cognitive style were more likely to assess correctly an account as being 'not fairly presented' than those auditors who were field dependent in cognitive style. She also found that auditors who were less tolerant of ambiguity were slightly more likely to assess correctly an account as being 'not fairly presented' than those auditors who were tolerant of ambiguity.

Although not previously used in accounting or auditing research, various investigators have used the Myers-Briggs Type Indicator (MBTI) as a means of measuring cognitive style (see for example Keen & Bronsema 1981; Davis *et al.* 1990; Murray 1990; Ruble & Cosier 1990). Keen & Bronsema (1981) and Murray (1990) provide the following arguments favoring the use of the MBTI:

1. The MBTI is based on a well-developed paradigm of psychological types derived from Jung (1921).
2. The instrument has good reliability and predictive validity (Murray 1990).
3. Empirical studies using the instrument among managers and professionals reveal differences between occupational types and job levels (Myers & McCaulley 1985).

In addition, previous studies have indicated a correlation between certain dimensions of the MBTI and the Group Embedded Figures Test (GEFT) (Corman & Platt 1988). To further test the applicability of the MBTI to investigations of cognitive style it was decided to use the MBTI as well as the MacDonald AT-20 Tolerance for Ambiguity instrument in this study. A modified version of the MBTI developed by Van de Poel (1986) for use in The Netherlands was used.

SUMMARY OF THE RESEARCH METHODOLOGY

Description of the MBTI

The MBTI is a forced-choice, self-report inventory that classifies individuals in accordance with an adaption of Jung's theory of psychological type (Jung 1921). The MBTI classifies individuals on four independent dimensions. Each dimension has two dichotomous preferences with only one preference ascribed to any one individual. The first dimension is a general attitude toward the world, which ranges from Extraverted (E) to Introverted (I). The second dimension measures a subject's preferences with regard to information acquisition and ranges from Sensing (S) to Intuition (N). The third dimension measures a subject's preferences with regard to information processing and ranges from Thinking (T) to Feeling (F). The fourth dimension is interpretive and measures a subject's preference for Judging (J) or Perceiving (P).

The information acquisition dimension (S-N) reflects whether an individual prefers Sensing (i.e. obtaining information through the five senses) or whether the individual prefers to become aware of things in the environment through indirect and often unconscious perception, that is Intuition. The information processing dimension (T-F) reflects whether an individual prefers Thinking or Feeling in order to reach conclusions. The individual with a preference for Thinking is generally logical and reaches conclusions based on impersonal findings and facts while the individual with a preference for Feeling is generally subjective and reaches conclusions based on personal values.

Some reported results using the MBTI as an indicator of cognitive styles include (Keen & Bronsema 1981):

1. Subjects indicating a preference for Thinking differ from subjects indicating a preference for Feeling in their level performance and time needed to perform complex decision-making tasks. Subjects indicating a preference for Thinking perform better, but take more time.

2. Subjects indicating a preference for Sensing differ from subjects indicating a preference for Intuition in terms of their learning behavior. Sensing types require experience with real objects before learning verbal and mathematical symbols. Intuition types prefer independent study.
3. Intuition types are relatively more creative. Sensing types are rarely found in fields associated with research or creative activities.
4. Different organizations attract different types. Sensing and Thinking types focus on factual details, technical features, impersonal control, and certainty. Intuition and Thinking types focus on broad global issues and theories of organization and are impersonally idealistic. Intuition and Feeling types tend to be global, general, personal, and humanistic. Finally, Sensing and Feeling types emphasize human relations, fact and precision, rather than global values. Previous research indicates that accountants and auditors tend to be Sensing types and Thinking types (Myers & McCaulley 1985).

Research Hypotheses

Previous studies of cognitive style have typically used English-speaking subjects. In particular, the MBTI, as an indicator of cognitive style, has been administered primarily to American subjects. There is little information concerning whether there may be cultural differences that would affect the responses of subjects to the MBTI. However, based on previous research with the MBTI it is anticipated that accountants and auditors in The Netherlands would indicate a preference for Sensing and for Thinking on the cognitive style dimensions of the MBTI (Myers & McCaulley 1985). Therefore, stated in null form, the initial research hypotheses are:

- H1₀: Subjects will not differ in their preferences for the opposing poles of the information acquisition (S-N) dimension of the MBTI.
- H2₀: Subjects will not differ in their preferences for opposing poles of the information processing (T-F) dimension of the MBTI.

Previous research has indicated a correlation between the information acquisition (S-N) dimension of the MBTI and other measures of cognitive style such as the Group Embedded Figures Test (Corman & Platt 1988). Persons who express a preference for Intuition are generally classified as more analytic on the GEFT. In regard to accounting and auditing tasks, previous research has indicated that there are several cognitive-style variables that are related to decision-making

variables including degree of analytic preference and tolerance for ambiguity (Lusk 1973, 1979; Pincus 1990). Therefore, both the information acquisition dimension (S-N) and the information processing dimension (T-F) of the MBTI may be related to an individual's analytic preferences. Thus, it is anticipated that auditors in The Netherlands who express a preference for Intuition on the information acquisition dimension of the MBTI will require more information and spend more time reviewing this information than those expressing a preference for Sensing. It is also anticipated that auditors in The Netherlands who express a preference for Thinking will require more information and spend more time reviewing this information than those expressing a preference for Feeling. Expressed in null form the hypotheses are:

H3₀: There is no difference between subjects who express a preference for Sensing on the information acquisition dimension of the MBTI versus those subjects who express a preference for Intuition in regard to number of information pages accessed (AP) and the total time to complete the task (TT).

H4₀: There is no difference between subjects who express a preference for Thinking on the information acquisition dimension of the MBTI versus those subjects who express a preference for Feeling in regard to number of information pages accessed (AP) and the total time to complete the task (TT).

Previous research has indicated that public accounting firms have different degrees of structure in their approach to auditing and may be classified as having either a highly structured or a less structured audit approach (Cushing & Loebbecke 1986; Kinney 1986; Bamber & Snowball 1988; Morris & Nichols 1988; Bamber & Tubbs 1989; Bamber *et al.* 1993). Accounting firms may attract persons that have cognitive styles that are congruent with the audit structures of the firms (Dirsmith & McAllister 1982). Because there is a lack of research regarding the audit structures of firms outside of the USA, it is somewhat difficult to extrapolate from the previous research dealing with audit structure to the setting of The Netherlands. Nevertheless, it is anticipated that the firms with a more structured audit approach will be more likely to attract individuals who express a preference for Thinking on the information processing dimension of the MBTI. In general, persons expressing a preference for Thinking require more information in order to perform a decision-making task and require more time to perform the task. This is congruent with Newton &

Ashton's (1989) finding that a structured audit approach increases the time required to complete the audit. Firms with a more structured audit approach might also be expected to attract persons who have a lower tolerance for ambiguity than firms with a less structured approach. Therefore, in null form:

- H5₀: There is no difference between subjects employed by firms with a highly structured audit approach and subjects employed by firms with a lower structured audit approach on the information processing (T-F) dimension of the MBTI.
- H6₀: There is no difference between subjects employed by firms with a highly structured audit approach and subjects employed by firms with a lower structured audit approach in regard to tolerance for ambiguity.

Research Design

The research design consisted of a field study wherein subjects were presented with a realistic, computerized audit case and asked to come to a conclusion about materiality. The case was an expanded version of a case used on the Netherlands Registered Accountant national qualifying exam (equivalent to the Certified Public Accountant's examination). The subjects were asked to evaluate information about a company (Midcom, a producer of advanced communications equipment) and to plan materiality guidelines for an audit. The subjects were required to evaluate Midcom on behalf of a larger company (Comsys) which wished to acquire Midcom. The subjects were told that they had 'a limited budget, and are required to carry out your task in the shortest possible time . . . based on information available'.

The Midcom case is a modification of The Netherlands professional examination question designed to examine materiality planning. There is no 'correct' answer to the materiality problem. The auditors who participated in this study were associated with three different accounting firms in The Netherlands. Based on the financial statements of Midcom, the audit manual of Firm 1 would calculate the materiality threshold at NLG 175,000, Firm 2's audit manual would indicate NLG 250,000, as the threshold, and Firm 3's audit manual indicates a range of from NLG 56,000 to NLG 709,850.

The information about the case included 29 computer screens ('information pages'), including two introductory pages, a problem statement, and 26 information pages containing, among other information, income statements and balance sheets for 4 years, information about management, valuations, market expectations, credit limits, audit values of assets, and results of compliance and substantive

tests (see Appendix for a complete list of variables). The subjects were allowed to select the information page they wanted to view by choosing an item on a menu. The sequence in which they selected information pages and the length of time they viewed each page were automatically recorded by the computer program. When the subjects reached a conclusion on the case, they were given the two cognitive style measurement instruments (i.e. MBTI and AT-20).

The subjects consisted of 25 practicing auditors ranging in age from 30 to 64 with from 5 to 39 years of auditing experience employed by the three largest public accounting firms in The Netherlands. Subjects were selected by the managing partners in each firm. Selection was made primarily on the basis of the subject's expertise in auditing. Other criteria used in the selection of subjects were as follows:

- Each subject must have had at least 3 years of auditing experience and must have reached at least senior auditor position within the firm.
- The collective group of subjects within each firm must have a client population that is heterogeneous with regard to industry type (e.g. manufacturing, trade, financial, service, non-profit, agricultural).
- The geographical dispersion of subjects within a firm should be as wide as possible (i.e. subjects should be from different offices of the firm).

By employing the criteria listed above it was felt that a reasonably representative sample of experienced auditors in The Netherlands was obtained. See Table 1 for a distribution of the number of subjects by firm. For purposes of confidentiality the names of the firms have not been indicated.

DATA PRESENTATION AND ANALYSIS

The key variables analysed in this study are: Information Processing Style (F) as measured by the Thinking-Feeling dimension of the MBTI

TABLE 1

<i>Number of subjects per firm</i>	
Firm 1	9
Firm 2	8
Firm 3	<u>8</u>
Total	<u><u>25</u></u>

(range - 8 to + 8); Information Acquisition Style (*S*) as measured by the Sensing-Intuition dimension of the MBTI (range - 8 to + 8); Tolerance for Ambiguity (TFAM) as measured by the AT-20 instrument (range - 20 to + 20); the number of information pages accessed by a subject (AP); the information access sequence (SS); the length of time that a page (1 through 29) was viewed by a subject (P1-P29), and total time used to reach a conclusion (TT). The following is a discussion and analysis of the results.

Are the cognitive styles of auditors in The Netherlands similar to the cognitive styles of other auditors as indicated by previous research? In this study cognitive styles are measured by the information acquisition dimension (S-N) and information processing dimension (T-F) of the MBTI. Based on scores on the MBTI, 17 subjects were classified as Sensing and 8 classified as Intuition (see Table 2). The probability of this observation is 0.033, based on the binomial probability distribution and the prior expectation that the probability of being Sensing or Intuition is equally likely in the population. Therefore, the null hypothesis (H1) that there is no difference between auditors on the information acquisition (S-N) dimension can be rejected. This result is consistent with previous research involving the use of the MBTI wherein it has been shown that accountants and auditors typically have a preference for Sensing (Myers & McCaulley 1985).

With regard to the information processing dimension, 14 subjects were classified as Thinking and 11 subjects were classified as Feeling (see Table 2). The probability of this observation is 0.13, based on the binomial probability distribution. Therefore, the null hypothesis (H2) that there is no difference between auditors on the information processing (T-F) dimension cannot be rejected. Table 2 summarizes the classification of subjects in each category of the two cognitive style dimensions of the MBTI.

In testing the hypothesis (H3) regarding whether there is a difference between subjects who express a preference for Sensing versus those

TABLE 2

Number of subjects in each Myers-Briggs category

		ACQUISITION		Total
		Sensing	Intuition	
PROCESSING	Feeling	7	4	11
	Thinking	<u>10</u>	<u>4</u>	<u>14</u>
	Totals	<u>17</u>	<u>8</u>	<u>25</u>

TABLE 3

Differences in information acquisition styles Sensing vs Intuition

Variable	Description	Sensing	Intuition	sig.
AP	Number of pages	38·3	54·1	0·15
TT	Total time	2817·7	3709·9	0·04*

Note: Two-tailed *t*-test, * $p \leq 0\cdot05$.

who express a preference for Intuition in regard to number of pages accessed (AP) and total time to complete the task (TT) we do not have a prior expectation as to which group (i.e. S or N) would be likely to access more information pages or take more time to complete the task. Sensing types generally prefer to deal with problems that are concrete in form and easily visualized and therefore may be quicker in completing a task if they feel that they have sufficient information. Intuitive types on the other hand are generally more adept at dealing with complex, analytic information, but may take more time in analysing this information. Differences were found between the subjects who expressed a preference for Sensing versus the subjects who expressed a preference for Intuition in regard to total time to complete the task (TT). The subjects who preferred Intuition took a total of 3,710 sec while those who preferred Sensing took a total of 2,818 sec ($p = 0\cdot04$) (see Table 3). Differences between Sensing and Intuition subjects in regard to number of pages accessed were not significant.

In testing the hypothesis (H4) as to whether there is a difference between subjects who express a preference for Thinking versus those who express a preference for Feeling in regard to number of pages accessed (AP) and total time to complete the task (TT) our prior expectation is that those subjects who express a preference for Thinking will access more information pages and will take more time to complete the task than those who express a preference for Feeling. Moderately significant differences were found between subjects who expressed a preference for Thinking versus Feeling in regard to the number of pages accessed (AP) and the amount of time expended (TT) (see Table 4). The subjects who preferred Thinking accessed a mean of 79 information pages, while those who preferred Feeling accessed a mean of 44 information pages ($p = 0\cdot03$). That the subjects who expressed a preference for Thinking accessed a greater number of pages is consistent with descriptions of the Thinking preference in that the Thinking preference is characterized as 'searching for as much relevant information as possible before reaching a conclusion on a decision-making task' (Myers & McCaulley 1985). It was also found that

TABLE 4

Differences in information processing styles Thinking vs Feeling

Variable	Description	Thinking	Feeling	sig.
AP	Number of pages	78·6	43·6	0·03*
TT	Total time	3467·4	2657·3	0·04*
P17	Valuation	191·0	44·8	0·02*
TFAM	Tol for ambiguity	1·38	7·14	0·01**

Note: One-tailed *t*-test, * $p \leq 0\cdot05$, ** $p \leq 0\cdot01$.

subjects who preferred Thinking spent more total time completing the task (3,467 sec versus 2,657 sec). This is also consistent with descriptions of the Thinking preference. The Thinking subjects also spent more time on certain types of information (e.g. Valuation). This information is generally more directly related to the task presented in the case and therefore is consistent with the Thinking preference in that more time is required in order to reach a conclusion on the task at hand.

Table 4 also indicates that subjects who preferred Thinking generally have a lower tolerance for ambiguity ($p = 0\cdot01$). Persons who have a lower tolerance for ambiguity have a general unwillingness to accept a state of affairs which may have alternate interpretations or alternate outcomes. Similarly such persons perceive ambiguous material or situations as unsettling. Some previous research has suggested that persons with a greater tolerance for ambiguity perform complex tasks in a superior manner (Ruble & Cosier 1990). However, Pincus (1990) found that auditors with a lower tolerance for ambiguity performed better than auditors with a higher tolerance for ambiguity on an audit judgment task. Therefore, it may be that lower tolerance for ambiguity is a desirable trait for auditors.

Are there differences in cognitive styles between auditors associated with different auditing firms? There appears to be differences in cognitive styles between the auditors associated with the three firms in this study, with relatively more comparability between Firm 2 and Firm 3 than between either of those firms and Firm 1. Based on the classification scheme initially developed by Kinney (1986) and subsequently used by others (Bamber & Snowball 1988; Morris & Nichols 1988; Bamber & Tubbs 1989; Bamber *et al.* 1993), the audit approaches of the three firms in this study were classified in order from most structured to least structured. Firm 2 was classified as having the most structured audit approach followed by Firm 3 and then Firm 1. Because of the lesser degree of structure of Firm 1, our prior

TABLE 5

Differences between auditing firms

<i>Variable</i>	<i>Description</i>	<i>Firm 1</i>	<i>Firm 2</i>	<i>sig.</i>
TFAM	Tol for ambiguity	6.33	0.25	0.01***
F	Inform. Processing	1.67	0.00	0.07*
P17	Valuation	40.2	158.8	0.01***
P21	Credit limits	29.8	93.1	0.05**
<i>Variable</i>	<i>Description</i>	<i>Firm 1</i>	<i>Firm 3</i>	<i>sig.</i>
TFAM	Tol for ambiguity	6.33	-2.00	0.02**
P17	Valuation	40.2	90.5	0.05**
<i>Variable</i>	<i>Description</i>	<i>Firm 2</i>	<i>Firm 3</i>	<i>sig.</i>
P9	P/L 1988	244.6	122.0	0.05**
P29	Audit values liab.	63.1	200.0	0.02**

Note: Data consist of the means of the variables for subjects employed by different firms. One-tailed *t*-test, * $p < 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$.

expectation would be that the subjects from Firm 1 would be less likely to express a preference for Thinking and would be more likely to have a tolerance for ambiguity.

In regard to tolerance for ambiguity (H5), there was a significant difference found between subjects from Firm 1 and subjects from Firm 2 ($p = 0.01$) and also between subjects from Firm 1 and Firm 3 ($p = 0.02$) (see Table 5). Therefore the hypothesis (H5) that there is no difference between auditors from firms with different audit structures in regard to tolerance for ambiguity is rejected. Since high tolerance for ambiguity can be defined as the willingness to accept a state of affairs that cannot be represented in clearly distinct terms, this is consistent with a lesser degree of structure in audit approach. It is also congruent with the previous research on audit structure that the subjects associated with Firm 1 would be generally more tolerant of ambiguity.

In regard to information processing, a weakly significant difference ($p = 0.07$) was found between subjects employed by Firm 1 and Firm 2, the least structured and the most structured firms respectively, on the information processing dimension (T-F) of the MBTI. No significant difference was found on this dimension between Firm 1 and Firm 3. However, Firm 3 is less structured than Firm 2 and, therefore, might be expected to be closer to Firm 1. Thus, while it may be problematic to reject the null hypothesis (H4) that there is no difference in cognitive styles (as measured by the information processing dimension) there is evidence of a difference in tolerance for ambiguity (H5) between the firms and the differences on these cognitive style measures are in the hypothesised direction.

In addition to the differences between the firms in regard to cognitive styles, are there other differences between auditors associated with different auditing firms in the type of information which they access or the manner in which they access the information? Some differences between the firms were found in several areas. These differences are shown in Table 5. While the most significant differences between the firms were in regard to tolerance for ambiguity and preference for Thinking versus Feeling, differences in amount of time expended examining certain of the information pages (e.g. Valuation and Credit Limits) were also found. One would predict that the subjects from the more structured firm would study the Valuation information for a longer period of time because it related directly to the task (i.e. valuation in a merger situation). The time of access of the Valuation information page showed a significant difference between Firm 1 and 2 ($p = 0.01$) and a moderately significant difference between Firm 1 and Firm 3 ($p = 0.05$). The subjects from Firm 1, the least structured firm, spent the least time looking at the Valuation information page, while subjects from Firm 2, the most structured, spent the most time. The subjects from Firm 3, which is moderately structured, spent less time than Firm 2, but more than Firm 1.

CONCLUSIONS AND LIMITATIONS

The results of this study lead to the following conclusions:

1. The cognitive styles of experienced auditors in The Netherlands appear to be similar to the cognitive styles of accountants and auditors in English-speaking countries as measured by the MBTI. Subjects indicated a preference for Sensing on the information acquisition dimension of the MBTI. This is consistent with previous research involving the use of the MBTI wherein it has been shown that accountants and auditors typically have a preference for Sensing (Myers & McCaulley 1985). The implications of this finding for auditing practice are that auditing may attract people who are practical and believe the facts provided by their senses (Sensing) instead of taking a pattern of information and putting it together by intuition (Intuition). This might cause difficulties in an audit situation where physical evidence has been deliberately contrived to mislead the auditor.
2. Auditors who differ on the Thinking versus Feeling dimension of the MBTI also differ in the manner in which they process information in that Thinking types process more information

(almost twice the number of information pages) and take a longer time (31% more) to do so. The Thinking type requires more time and information in an audit than the Feeling type, a difference which may be considered when planning personnel for an audit engagement. It might benefit auditing firms to recognize differences in cognitive styles in a more explicit manner.

3. Subjects who differ on the Thinking versus Feeling dimension also appear to differ in their levels of tolerance for ambiguity, with those who express a preference for Feeling having a greater degree of tolerance for ambiguity. On the other hand, subjects with a lower tolerance for ambiguity accessed more information. This result should be compared with Pincus's finding that auditors with a lower tolerance for ambiguity generally performed better on an audit judgment task. It might be appropriate for recruiters to consider low tolerance for ambiguity in addition to their typical criteria when hiring for the firm.
4. There were differences found between subjects from different auditing firms in the level of tolerance for ambiguity and information processing preference (T-F). This may be a function of differences in the audit structures of the firms.

The results of this study are subject to the following limitations:

1. The subjects were not randomly selected. Subjects were selected because they were experienced in making audit judgments. Therefore, the generalisability of the results may be limited.
2. Although the subjects considered the case to be realistic, the shortcomings common to all experimental settings apply here (e.g. the researchers cannot determine if the subjects would react similarly if they encountered the same situation in practice). Audit practitioners face a multitude of tasks and judgment points which cannot be captured in a case.
3. The number of subjects ($N = 25$) is small. Again this affects the generalisability of the results. In a study currently underway, a replication of this study will be made with an increased sample size.

In conclusion, the cognitive styles of experienced auditors in The Netherlands appear to be congruent with the cognitive styles of other accountants and auditors. In general there is a preference for the Sensing end of the information acquisition dimension. Auditing firms tend to employ persons with cognitive styles that are congruent with their audit structure. This study could be extended by adding other variables that might interact with cognitive style such as subject's level of experience and training, although we did not find any apparent differences related

to experience in this study. A case with a 'correct' solution might be substituted for the Micom case to determine how cognitive characteristics might affect the 'correct response'.

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APPENDIX

Variables in study

Variable	Brief description
TFAM	Tolerance for Ambiguity
F	Information Processing Style
S	Information Acquisition Style
R	Correlation Standard Sequence
AP	Number of Information Pages
TT	Total Time Taken
P1	Assets 1985
P2	Assets 1986
P3	Assets 1987
P4	Assets 1988
P5	P/L 1985
P6	P/L 1986
P7	Problem definition
P8	P/L 1987
P9	P/L 1988
P10	Liabilities 1985
P11	Liabilities 1986
P12	Liabilities 1987
P13	Liabilities 1988
P14	Investments
P15	Management
P16	Contracts
P17	Valuation
P18	Personnel
P19	Market expectations
P20	Motivation selling price
P21	Credit limits
P22	Setup AO/IC
P23	Results compliance tests
P24	Results substantive tests
P25	Audit values assets 31/12 '88
P26	Audit values P/L 1988
P27	Introduction 1
P28	Introduction 2
P29	Audit values liabilities 31/12 '88