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Empirical Analysis of Decision Maker's Schema and Cognitive Fit on Decision Performance*

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This paper proposes a new framework to predict decision performance by investigating the cognitive fit of decision makers. We assume that every decision maker has two kinds of schema: emotional and rational. Cognitive fit is believed to have a close relationship with the two schemata and decision performance. In the literature on decision performance there is few studies investigating the relationship between the two schemata and cognitive fit. Therefore, our research purposes are twofold: (1) to provide a theoretical basis for the proposed framework describing the causal relationships among the two schemata, cognitive fit, and decision performance, and (2) to empirically prove its validity in the application to an Internet shopping environment. Based on the questionnaires from 104 respondents, we used a second order, confirmatory factor analysis (CFA) model to extract valid constructs, and a structural equation model (SEM) to calculate path coefficients and prove the statistical validity of our proposed research model. The experimental results supported our research model.

Keywords : IS Usage, Emotional Schema, Rational Schema, Cognitive Fit, Confirmatory Factor Analysis, Structural Equation Model, Decision Performance

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Ⅰ. Introduction

In the field of decision making with information systems (IS), many researchers have proposed important theoretical contributions such as TRA (Theory of Reasoned Action) [Fishbein, 1967], TPB (Theory of Planned Behavior) [Ajzen, 1985], and TAM (Technology Acceptance Model) [Davis, 1989; Davis *et al.*, 1989]. The main thrust of these theories is summarized as sequential, cause-effect relationships like *external variables-beliefs-attitude-behavioral intention.* In the literature regarding IS topics, many studies applying these theories successfully have been published [Gefen *et al.*, 2003; Heijden, 2004; Venkatesh, 2000; Venkatesh and Davis, 2000]. However, we believe that there is still a theoretical void where new constructs and perspectives should be dealt with rigorously. In this sense, this study proposes a new theoretical perspective to enhance the decision performance related with using IS. We attempt to enrich the decision performance which flows from using a particular IS based on the perspective of *cognitive* fit [Vessey, 1991].

Decision makers are known to function on the basis of a series of pre-existing assumptions about the way the surrounding world is organized [Axelrod, 1973; Bartlett, 1932; Rumelhart, 1980], a foundation which is termed schema in the literature regarding cognitive science. Hence it may be theoretically seamless if we propose that these pre-existing assumptions also significantly affect the quality of decision making. Our research motivation starts with the propositions as follows. First, all decision makers are believed to have two kinds of schema: emotional and rational. Second, each schema may cooperate with the other to influence cognitive fit depending on the decision situation. Third, cognitive fit is created from the activation of these two schemata. Fourth, decision performance depends on the quality of cognitive fit.

The theoretical contributions of this study are as follows:

(1) Investigating the three new constructs of emotional schema, rational schema, and cognitive fit in an Internet shopping environment.

(2) Proving the theoretical validity of replacing the traditional framework, *external variables-beliefs-attitude-behavioral intention,* which describes how the behavioral intention is created, with a new framework, *external variables-schemata-cognitive fit-decision performance,* where schemata and cognitive fit are newly introduced.

(3) Experimenting with real data related to purchase decision making in Internet shopping to prove the empirical validity of the proposed research framework.

Ⅱ. Theoretical Background

2.1 Information Systems Adoption Theory

Understanding why people accept or reject computers has proven to be one of the most challenging issues in IS research. Investigators have studied the impact of users' internal beliefs and attitudes on their usage behavior, and how these internal beliefs and attitudes are, in turn, influenced by various external factors, including the system's technical design charac-

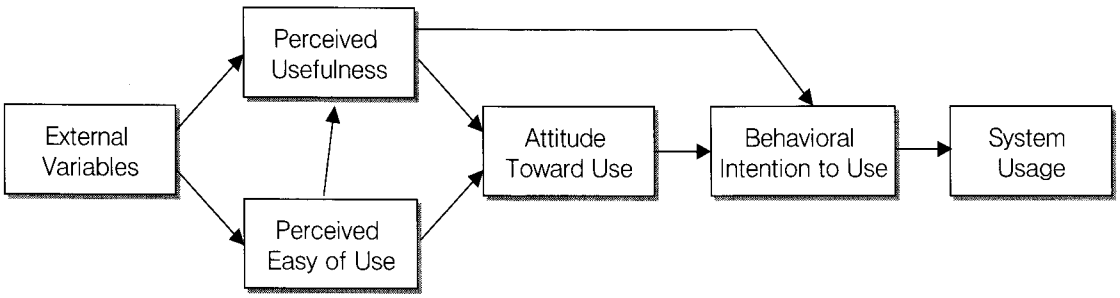
teristics, user involvement in system development, the type of system development process used, the nature of the implementation process, and cognitive style. In general, however, these research findings have been mixed and inconclusive.

Davis [1989] adapted TRA [Ajzen and Fishbein, 1980; Fishbein, 1967] to form TAM, which is specifically meant to explain computer usage behavior. TAM uses TRA as a theoretical basis for specifying the causal linkages between two key beliefs, perceived usefulness and perceived ease of use, and a user's attitudes, intentions and actual computer adoption behavior. TAM is considerably less general than TRA and is designed to be applied only to computer usage behavior. Nevertheless, because it incorporates findings accumulated from over a decade of IS research, it may be especially well suited for modeling computer acceptance [Davis *et al.*, 1989].

Perceived usefulness is "the degree to which job performance is believed to be enhanced by a particular IS" [Davis, 1989, p. 320]. This follows from the definition of the word useful: "capable of being used advantageously." Within an organizational context, people are generally reinforced for good performance by raises, promotions, bonuses and other rewards. A system high in perceived usefulness, in turn, is one for which a user believes in the existence of a positive use-performance relationship. Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort" [Davis, 1989, p. 320]. This follows from the definition of the word ease: "freedom from difficulty or great effort." Effort is a finite resource that a person may allocate to the various activities for which he or she is held responsible. All else being equal, an application perceived to be easier to use than another is more likely to be accepted by users.

Two other constructs in TAM are attitude towards use and behavioral intention to use. Attitude towards use is the user's evaluation of the desirability of employing a particular IS application. Behavioral intention to use is a measure of the likelihood a person will employ the application [Ajzen and Fishbein, 1980]. TAM's dependent variable is actual usage. It has typically been a self-reported measure of time or frequency of employing the application. <Figure 1> shows the generic TAM model.

Several recent studies have considered additional relationships [Adams *et al.*, 1992; Bhatta-



<Figure 1> Representative IS Adoption Model: TAM Model

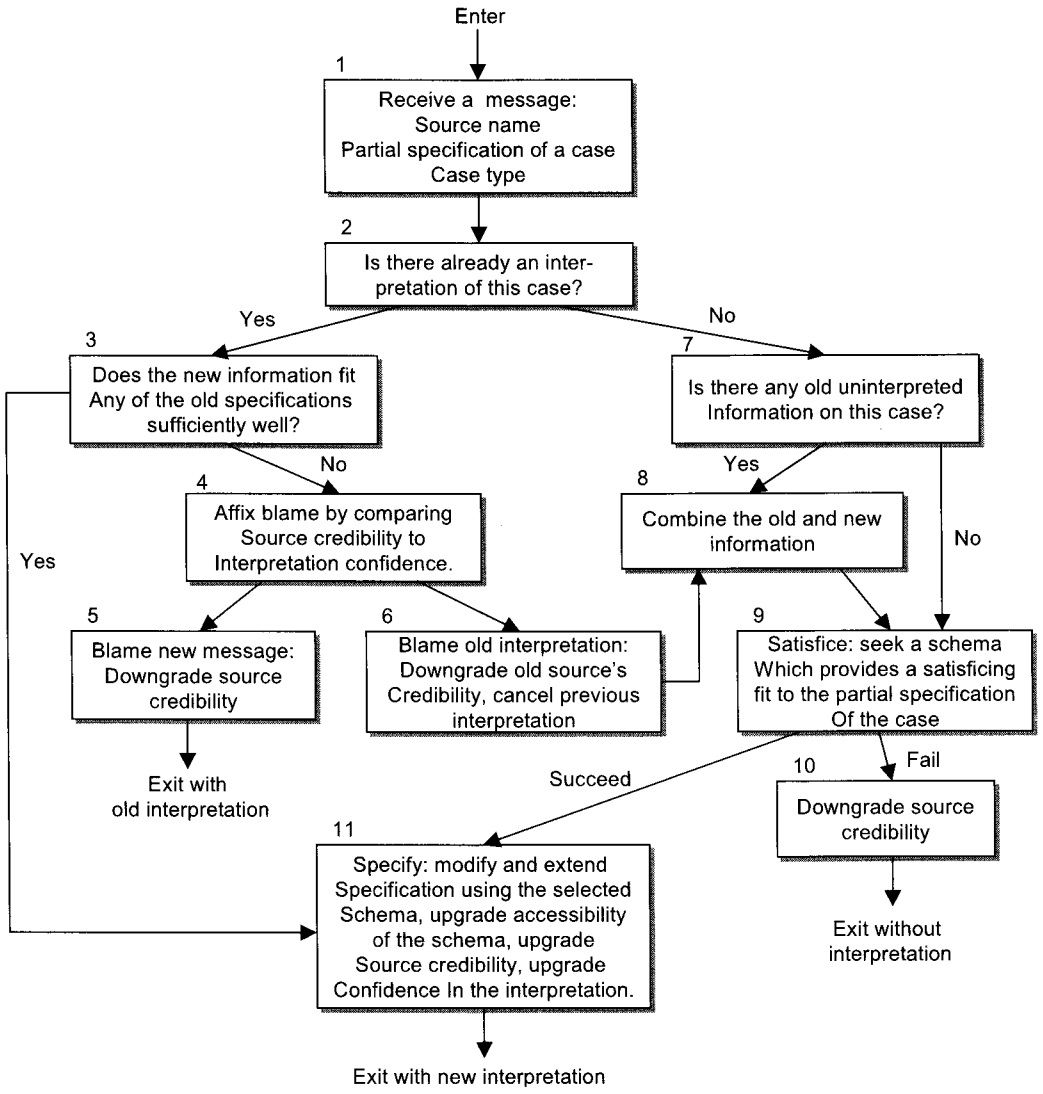
cherjee, 2000; Mathieson, 1991; Taylor and Todd, 1995; Venkatesh, 2000; Venkatesh and Davis, 1996, 2000]. For instance, Venkatesh [2000] and Venkatesh and Davis [2000] have been applied and tested in several, subsequent, user technology, acceptance/adoption investigations.

2.2 Schema Theory

Bartlett [1932] first proposed the concept of schema to provide a mental representation (or framework) for understanding, remembering and applying information coming from the outer world. Schemata are created through experience with the world, and the person's character and culture, which includes the interactions with people, objects and events within that culture. Generally, behavioral learning theory such as *Attitudes* argues that learning is the process of combining items of information. However, a schema is based on cognitive-psychological learning theory. Cognitive-psychological learning theory argues that learning is the development of cognitive structures of organized prior knowledge, abstracted from experience with specific instances [Fiske and Linville, 1980, p. 543]. In other words, a schema exists in the form of a higher order or abstract cognitive structure that people hold in their past experience. Since attitude is related to a psychological tendency from people's cognition or abstract cognitive structure, a schema is partly related with a cognitive aspect of attitude [Taylor and Crocker, 1981], but is a broader concept than attitude.

Axelrod [1973] addresses the process related to the schema theory, which is depicted in <Figure 2>. The process model for the schema proposed by Axelrod [1973] enabled cognitive science researchers of schema to solve several decision-making problems more systematically [Marshall, 1995]. For example, an individual decision-maker's schema can be represented as a vehicle of memory, leading to (1), organization of an individual's similar experiences in such a way that the individual can draw inferences, make estimates, create goals, and develop plans using the schema process framework as shown in <Figure 2>, and (2), calculation of an individual's decision by using symbolic reasoning such as the expert systems rule [Waterman, 1986] and connectionist processing like neural network [Rumelhart *et al.*, 1986].

Therefore, schema theory helps us understand how a person's mental perceptions about a specific object can be organized through experience. As a person's schema is constructed, he/she can understand a particular object more clearly. We propose that such a schema may be divided into two kinds: *rational schema* and *emotional schema* [Lieberman and Flint-Goor, 1996; Onita and Dhaliwal, 2010]. Rational schema depends on prior information and knowledge which has been accumulated through education and professional experience. Emotional schema is related to describing the psychological process leading into a specific behavior or satisfaction [Lieberman and Flint-Goor, 1996]. To view these two schemata from their intrinsic definition, we can easily conjecture that rational schema may be influenced by systematic learning related constructs, while emotional schema by individual characteristics and cultural factors.



<Figure 2> Process Model for Schema Theory(Adapted from Axelrod[1973])

Ⅲ. Research Hypotheses and Model

Since schema is largely an unexplored area in IS research, we use IS adoption research as the starting point for our work. Many of the research constructs have been informed by IS adoption theory [Adams *et al.*, 1992; Bhattacherjee, 2000; Mathieson, 1991; Taylor and Todd, 1995; Venkatesh, 2000; Venkatesh and Davis, 1996, 2000]. We employ theoretical insights and some constructs from this theory to explore the schema-cognitive fit.

3.1 Emotional Schema

As mentioned in the previous section, emotional schema is related to an individual's cha-

racter and culture. Since we limit our research focus to the issue of how decision performance on Internet shopping is affected by causal relationships among *external variables- schema-cognitive fit*, we suggest three constructs as external variables describing emotional schema: computer anxiety, trust propensity and individualism. These constructs are related to the decision maker's psychographic characteristics [Lieberman and Flint-Goor, 1996].

Computer Anxiety Computer anxiety is defined as an individual's apprehension when faced with the situation of using computers [Simonson *et al.*, 1987]. While computer self-efficacy [Bandura, 1978], relating to judgments about ability, and computer playfulness, relating to the spontaneity in an individual's interaction with a computer, are both positively related to using computers, computer anxiety is a negative affective reaction toward computer use. Raub [1981] describes computer anxiety as a form of "state anxiety," with the computer representing a personally threatening stimulus. She conceptualized computer anxiety to be a multidimensional construct composed of apprehension for computers, computer usage anxiety, and anxiety concerning the negative impact of computers on society. Harrison and Rainer [1992] further describe computer anxiety as "a response to interaction or anticipation of interaction with automated data or information processing systems," A significant body of research in IS and psychology has highlighted the importance of computer anxiety by demonstrating its influence on key dependent variables. For example, computer anxiety has been shown to have a significant impact on attitudes, intention, behavior, and performance [Venkatesh, 2000].

Trust Propensity Hofstede [1980] found that people with different cultural backgrounds, personality types and developmental experiences vary in their propensity to trust. This propensity to trust is viewed as a personality trait, describing a propensity which might be thought of as the general willingness to trust others [Lee and Turban, 2000]. This is a position supported by Mayer *et al.* [1995]. Propensity might be thought of as the general willingness to trust others. Propensity will influence how much trust one has for a trustee prior to data on that particular thing being available. In determining whether and to what extent to trust, a user looks for cues. The effect of trust propensity is to magnify or reduce the signals provided by these cues. Furthermore, this effect acts positively in the sense that the higher the level of trust propensity, the higher the impact of trust attributes on the formation of trust. Trust is an important factor, especially under the conditions of uncertainty and risk. Johnson-George and Swap [1982, p. 1306] asserted that "willingness to take risks may be one of the few characteristics common to all trust situations." Kee and Knox [1970] argued that to appropriately study trust there must be an understanding of the risk involved. Buying on the Internet is a new form of commercial activity, which tends to involve a higher degree of uncertainty and risk than traditional shopping. Internet shops tend to be less well known to consumers. Consumers cannot physically check the quality of the products before making a purchase, nor can they fully monitor the safety

and security of the sensitive personal and financial information that is sent though the Internet to a party whose behaviors and motives may be hard to predict. The importance of trust in electronic commerce cannot be over-estimated [Lee and Turban, 2000].

Individualism Hofstede [1997] asserts that individualism pertains to how everyone in a society or organization is expected to look after their own interests or immediate family. However, this study views individualism as a negative subjective norm which indicates that an individual tends to focus on his/her own tastes and interests despite the influence or pressure coming from the external environment such as society and/or organization that he/she is working in.

The importance of cultural factors in communication has been reinforced by recent research. Several studies relate cultural models and national cultural differences to problems in IS and user-interface design. Thatcher [1999] connects South American history, social class, and educational differences to stark differences between the practices of communication professionals in the U.S. versus those in South America. Flint *et al.* [1999] report the results of developing a multilingual hypertext guide to international communication. Adams *et al.* [1999] discuss writing and design skills pertaining to global communication. By combining Hofstede's four dimensions of culture with other cultural standards, Honold [2000] investigates how people from different countries (Germany and China) learn new information.

Our research, on the other hand, is one of the first attempts to identify the influence of cultural characteristics on emotional schema and decision satisfaction. Based on the literature regarding cultural studies, IS, and organization, we have identified the cultural factors that could impact the emotional schema of decision making. Especially, this research uses Hofstede [1997]'s five dimensions of culture that can be measured relative to other cultures: power distance, collectivism versus individualism, femininity versus masculinity, uncertainty avoidance, and long-term versus short-term orientation. In addition, we use Hall [1983]'s suggestion of monochronic versus polychronic time as a cultural dimension. Finally, we adopt the concepts of individualism and monochronic time [Hall, 1983; Hofstede, 1980; Merritt, 2000].

Hofstede [1997] defines the cultural dimension of individualism (as opposed to collectivism) as follows: "Individualism pertains to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family." Hofstede's "individualism index" (IDV) reveals that countries such as the U.S. and Sweden are ranked high (91 and 71, respectively), whereas the Arabic-speaking countries and Indonesia are ranked low (38 and 14, respectively). Monochronic (as opposed to polychronic) cultures prefer doing one thing at a time, compartmentalize relationships and tasks according to strict time schedules, value promptness and adherence to plans, and rely on communications in which most of the information must be included in the message itself with details clearly spelled out. Hall [1983] identifies Mediterranean, Latin American, Arabic, and Asian countries (especially Japan) as largely polychronic, but North American and European countries

(especially Germany and Switzerland) as monochronic.

3.2 Rational Schema

In the meantime, rational schema, which is related to addressing a rather objective and professional experience accumulated through long-term learning and education, can be supported by the three external variables of computer self-efficacy, facilitating condition, and system experience.

Computer Self-efficacy Self-efficacy is defined by Bandura [1978, p. 240] as a judgment of a person's ability to execute a particular behavioral pattern which has a high correlation with environment and cognitive factors (i.e., outcome expectations). Therefore, computer self-efficacy is related to the judgment of an individual's ability to use a computer.

Self-efficacy theory is an important component of Bandura's [1986] more general social cognitive theory, which suggests that an individual's behavior, environment, and cognitive factors (i.e., outcome expectations and self-efficacy) are all highly interrelated [Staples *et al.*, 1999]. Bandura [1978, p. 240] defined self-efficacy as "a judgment of one's ability to execute a particular behavior pattern." Self-efficacy judgments also determine how much effort people will spend on a task and how long they will persist with it [Wood and Bandura, 1989]. People with strong self-efficacy beliefs exert grater efforts to master a challenge while those with weak self-efficacy beliefs are likely to reduce their efforts or even quit [Bandura and Schunk, 1981].

Self-efficacy theory [Bandura, 1977] suggests that there are four major sources of information used by individuals when forming self-efficacy judgments. In order of strength, the first is performance accomplishments, which refers to personal assessment information that is based on an individual's personal mastery accomplishments (i.e., past experiences with the specific task being investigated). Previous successes raise mastery expectations, while repeated failures lower them. The second is vicarious experience, which is gained by observing others perform activities successfully. This is often referred to as modeling, and it can generate expectations in observers that they can improve their own performance by learning from what they have observed [Bandura, 1978]. Social persuasion is the third, and it refers to activities where people are led, through suggestion, into believing that they can cope successfully with specific tasks. Coaching and giving feedback on performance are common types of social persuasion [Bandura, 1977]. The final source of information is physiological and emotional states. The individual's physiological or emotional states influence self-efficacy judgments with respect to specific tasks. Emotional reactions to such tasks (e.g., anxiety) can lead to negative judgments of one's ability to complete the tasks [Bandura, 1978].

Facilitating Condition Facilitating condition is an external control aspect of computer self-efficacy, describing resource availability and personal ability to facilitate computer use [Bhattacherjee, 2000; Taylor and Todd, 1995; Venkatesh,

2000]. Self-efficacy is an internal control affecting IS, while facilitating condition (beliefs about the availability of resource to facilitate that behavior) is an external control [Bhattacherjee, 2000]. External control is expected to exert its influence in the form of individual perception of technology and resource facilitating condition [Taylor and Todd, 1995]. Specially, control such as self-efficacy and facilitating condition relates to an individual's perception of the availability of knowledge, resources, and opportunities required to perform the specific behavior [Venkatesh, 2000].

System Experience We assume that a variety of computer outcomes may be derived from a user's system experience which enables the accumulation of knowledge about using the computer. Levin and Gordon [1989] found subjects owning computers more motivated to familiarize themselves with computers and to possess more affective attitudes toward computers than did subjects not owning computers. Through system experience, users can become knowledgeable about computer use for various purposes to obtain what they want [Martin, 1988]. Experience with computers has served as a correlate to a variety of computer-related outcomes. In a study of adoption of advanced manufacturing technology, shop-floor employees who had worked with computers had more favorable attitudes toward complex uses of computers than those who had not [Martin, 1988]. Dambrot *et al.* [1988] found that subjects failing an assembly-language programming course had significantly less computer experience than those passing the course.

3.3 Decision Performance with Cognitive Fit

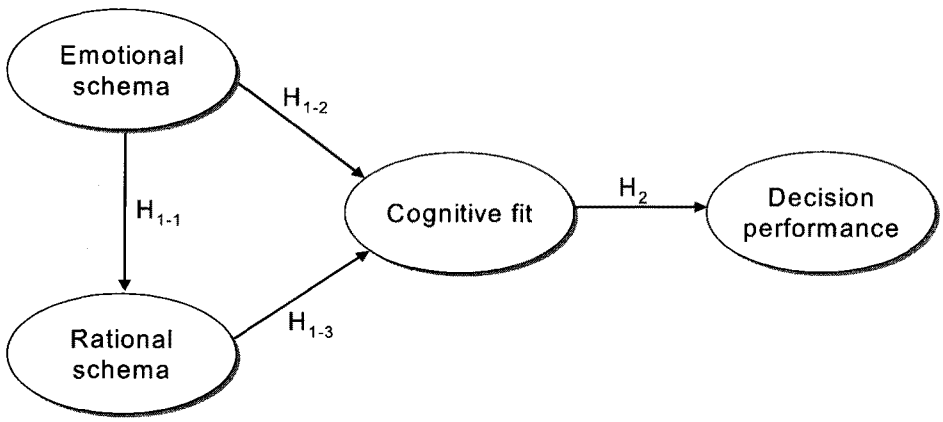
Fit usually occurs when a matching among factors describing a particular thing is made [Van de Ven and Drazin, 1985; Venkatraman and Camillus, 1984; Venkatraman, 1989]. Similarly, cognitive fit is believed to be generated in a decision maker's psychology and mental realm when emotional schema matches well with rational schema [Vessey, 1991]. Emotional schema describes a user's emotional aspect which seems relevant to solving a particular decision making problem. Therefore, it is related with psychological terms such as anxiety, propensity, and individualism. Rational schema is linked with the rational aspect of a user's knowledge which seems relevant to solving a problem. Based on our review of the previous related literature and the decisions gathered from researchers, we developed our proposed model.

<Figure 3> presents the general model of decision performance on which the cognitive fit argument is based. The model views decision performance as an outcome of the relationship between emotional schema and rational schema. The flows and arrows linking pairs of elements in the model represent processes in the model. Cognitive fit is the way that information is processed in the human working memory. In this context, it is a subset of the total problem space. Cognitive fit is formulated using the characteristics of both emotional and rational schemata. Specifically, it is derived from the interaction of the appropriate processes on the information in the emotional and rational schemata [Vessey and Galletta, 1991].

When the types of information emphasized in the emotional-rational schema match, the decision maker (consumer) uses processes (and therefore formulates a cognitive fit) that also emphasize the same type of information. Consequently, the processes the decision maker uses for both emotional and rational schemata will match, and the cognitive fit process will be facilitated. In other words, matching emotional schema to rational schema leads to the use of a similar, and therefore consistent, decision making process, and hence to the formulation of a consistent cognitive fit. There is no need to transform cognitive fit to accommodate the use of different processes to extract information from the schema and to make the decision. Hence, decision satisfaction with cognitive fit leads to effective and efficient decision performance.

When a mismatch occurs between emotional and rational schemata, similar processes cannot be used to both act on the same situation, and decision makers will therefore no longer be guided in their choice of decision making process. They will either formulate a cognitive fit based on the emotional schema, in which case they will need to transform it to derive a solution to the problem, or they will formulate a cognitive fit based on the rational schema, in which case they will need to transform the knowledge derived from this rational schema into a cognitive fit suitable for decision making. In either case, decision performance will be worse than if the decision makers had been supplied with an emotional schema emphasizing the type of information that best supported decision making.

We posit that cognitive fit is strongly affected by the fit between these two schemata, thereby positively influencing four properties of decision making: speed, reliability, confidence, and consistency [Aldag and Power, 1986; Bowman, 1963; Klein and Jiang, 1999; Oz *et al.*, 1993; Power *et al.*, 1994]. Furthermore, we posit that the most promising emotional-rational schema fit is the idea of fit as covariation. According to this perspective, fit is a pattern of covariation or internal consistency among a set of underlying, theoretically related variables [Venkatraman, 1989].



<Figure 3> Proposed Research Model

Decision performance in this context relates to the accomplishment of decision making by an individual. Higher decision performance implies some mix of higher satisfaction. Therefore, in this study decision performance was measured by decision satisfaction measurements in lieu of performance measurements [Bhattacherjee, 2001].

3.4 Research Model

Our proposed research model is based on the two schemata and cognitive fit to describe the relationship to decision performance. Since we assume that cognitive fit starts with congruence between emotional and rational schemata, while maintaining a positive relationship to decision performance, the following relationships are organized as shown in <Figure 3>.

From the research model in <Figure 3>, we can assume additionally that the two schemata have a direct impact on cognitive fit, and thereby have an indirect influence on decision performance. One of the trickiest research issues we want to resolve herein is whether or not the two schemata influence cognitive fit *concurrently*. "Concurrently" means that both of the two schemata affect cognitive fit directly at the same time. Therefore, the reverse of this premise is that only one of the two schemata directly influences cognitive fit.

Summarizing these research issues and assumptions yields the following research hypotheses.

Hypothesis 1: Both of the two schemata influence cognitive fit concurrently.

Hypothesis 1-1: Emotional schema has a positive influence on rational schema.

Hypothesis 1-2: Emotional schema has a positive influence on cognitive fit.

Hypothesis 1-3: Rational schema has a positive influence on cognitive fit.

Hypothesis 2: Cognitive fit has a direct and positive influence on decision performance.

Ⅳ. Research Methodology

4.1 Measurement Development

The proposed framework to predict decision performance is used to analyze the experience of individuals shopping on the Internet. To develop the questionnaire, we use several constructs described in section 3, most of which have been validated in the literature, with the exception of cognitive fit. The validity of the items representing each construct has been demonstrated in the relevant literature, as listed in <Table 1>. An initial version of the questionnaire was tested by three experts having practical and academic expertise in the field of Internet shopping.

Keeping in mind that our basic research is focused on analyzing the validity of the new relationship *external variables-schemata-cognitive fit-decision performance* in the case of Internet shopping, it should be noted that the operationalization of the two schemata is very complex because they include many sophisticated concepts or constructs to represent their mean-

<Table 1> Operationalized Questionnaire Item

Construct	Measure	Source
Emotional Schema	**Computer Anxiety:** Working with a computer makes me nervous. (CA1)† I do feel threatened when others talk about computers. (CA2)† It would bother me to take courses using computers. (CA3) Computers make me feel uncomfortable. (CA4) Computers make me feel uneasy. (CA5)	Bandura [1978], Simonson *et al.* [1987], Venkatesh [2000]
	Trust propensity: It is easy for me to trust a person/thing. (TP1) My tendency to trust a person/thing is high. (TP2) I tend to trust a person/thing, even though I have little knowledge of it. (TP3)† Trusting someone or something is not difficult. (TP4)	Hofstede [1980], Lee and Turban [2000]
	Individualism: I prefer looking after myself and my immediate family. (IN1) Having sufficient time for personal and family life is important to me. (IN2) It is important for me to have challenging tasks and get a personal sense of satisfaction. (IN3)†	Hofstede [1997]
Rational Schema	**Computer Self efficacy:** I could complete the job using the system …. .… If I had never used a package like it before. (CS1)† .… If I had seen someone else using it before trying it myself. (CS 2) .… If I had a lot of time to complete the assignment for which the system was provided. (CS 3) .… If someone showed me how to do it first. (CS 4) .… If I had used similar packages before this one to do the same job. (CS 5)	Bandura [1978], Venkatesh [2000]
	Facilitating Condition: I have control over using the system depending on my needs and situations. (FC1)† I have the resources necessary to use the system. (FC2) I have the knowledge necessary to use the system. (FC3) Given the resources, opportunities and knowledge it takes to use the system, it would be easy for me to use the system. (FC4)†	Bhattacherjee, [2000], Taylor and Todd [1995], Venkatesh [2000]
	System Experience: I am very skilled at using the Internet. (SE1) I consider myself knowledgeable about good search techniques on the Internet. (SE2) I know more about using the Internet than most users. (SE3) I know how to find what I want on the Internet using a search engine. (SE4)	Levin and Gordon [1989], Martin [1998]
Cognitive Fit	Supposing that you take into consideration two dimensions above such as individual tendency, and individual knowledge and experience, how much do you think the following decision quality factors about the Internet shopping improve? ◦ Decision making speed (CR1)† ◦ Decision making reliability (CR2) ◦ Decision making confidence (CR3) ◦ Decision making consistency (CR4)	Aldag and Power [1986], Bowman [1963], Klein and Jiang [1999], Oz *et al.* [1993], Power *et al.* [1994]
Decision performance	Supposing that you take into consideration two dimensions above such as individual tendency, and individual knowledge and experience above, how much do you think you are satisfied with your decision about the Internet shopping? ◦ Very dissatisfied/Very satisfied (DS1) ◦ Very displeased/Very pleased (DS2) ◦ Very frustrated/Very contented (DS3) ◦ Absolutely terrible/Absolutely delighted (DS4)	Bhattacherjee [2001]

Note) Likert 1~7 scale, 1 = Very Low, 7 = Very High.
† These items were dropped from the final scales.

ing more clearly in the Internet shopping environment. For example, we found from the literature [Hofstede, 1980, 1997; Venkatesh, 2000] that emotional schema should be supported by the additional three constructs of computer anxiety [Venkatesh, 2000], trust propensity [Hofstede, 1980], and individualism [Hofstede, 1997], all of which seem relevant for describing the user's emotional framework to be used in Internet shopping. Likewise, rational schema to be used in Internet shopping is presumed here to be supported by the additional three constructs of computer self-efficacy [Venkatesh, 2000], facilitating condition [Venkatesh, 2000], and system experience [Levin and Gordon, 1989].

Because of the complexity in precisely operationalizing the two schemata, they need to be represented with a second order factor analysis model, which is a form of confirmatory factor analysis [CFA; Hair *et al.*, 1998]. The specifics of this analysis will be demonstrated in our next research paper.

4.2 Data Collection

Questionnaire data was gathered from 138 undergraduate students enrolled in a large private university located in Seoul, Korea. These students were taking courses on the application of Internet to managerial issues, which the authors were administering as instructors. We described the characteristics of the questionnaire and the points which required careful attention while answering the questionnaire. We announced in class before the questionnaire survey that each respondent who completed the questionnaire successfully within one week would receive a fixed additional credit in the final grade as an incentive. In this way, the validity regarding the questionnaire survey was improved. The final number of successful respondents was 104 and the demographic data is presented in <Table 2>. The questionnaires were collected through the web site where our questionnaire was posted. We adhered to the procedures described by Birnbaum [2000] to

<Table 2> Demographic Data for the Respondents

Classification	Item	Frequency	Percentage
Gender	Male	81	77.9%
	Female	23	22.1%
Age	Less than 20	1	1.0%
	20~30	101	97.1%
	Greater than 30	2	1.9%
Income	Less than 1 million won	92	88.5%
	1~2 million won	12	11.5%
Internet Experience	Less than 2 Years	9	8.7%
	2~3 Years	25	24.0%
	Greater than 3 Years	70	67.3%

ensure the validity of the web-based, questionnaire survey.

4.3 Results

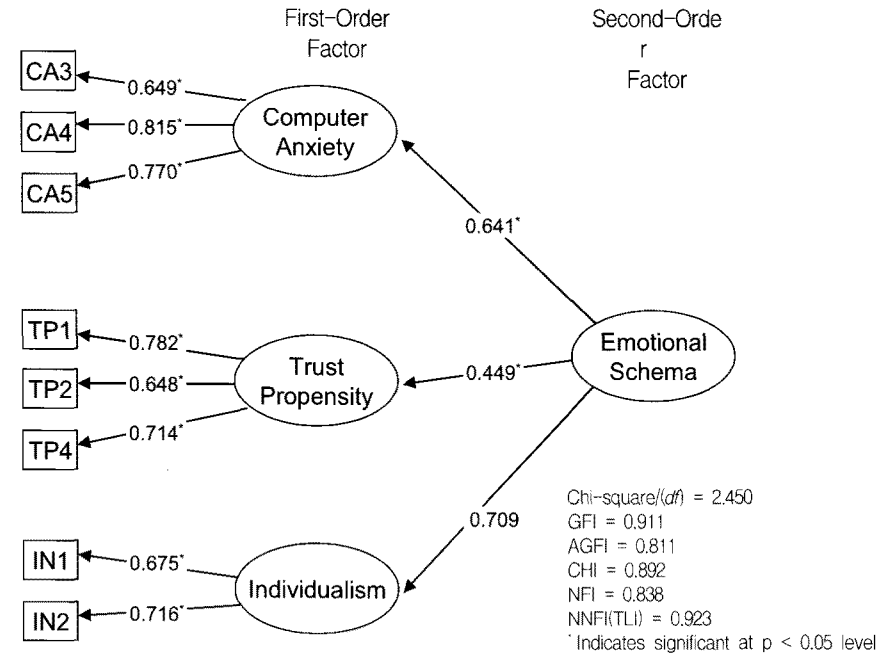
The basic statistical methods used in the experiment were structural equation model (SEM) and CFA. SEM evaluates a number of linear regression equations holistically, producing various fit measures to show how the path coefficients calculated can be used validly for further analysis [Hair *et al.*, 1995]. Recently, CFA has been receiving favorable attention from both researchers and practitioners [Anderson and Gerbing, 1981; Fornell and Larcker, 1981; Hair *et al.*, 1998] because several inherent limitations have been identified in the traditional exploratory factor analysis [Ahire *et al.*, 1996].

Three steps were used for our experiments: CFA, SEM, and hypotheses testing. CFA was applied to verify the validity of the relevant constructs from the data obtained by questionnaire survey. Regarding the validity of the two schemata constructs, we performed second order factor analysis [Hair *et al.*, 1998]. The overall fit measures indicated a fairly good fit for the emotional schema model (Chi-square/df = 2.450; GFI = 0.911; AGFI = 0.811; CFI = 0.892; NFI = 0.838; NNFI = 0.823), and a better fit for the rational schema model (Chi-square/df = 1.429; GFI = 0.924; AGFI = 0.869; CFI = 0.973; NFI = 0.917; NNFI = 0.962). <Figure 4> depicts the second order CFA results for the two schemata. <Table 3> describes the measurement properties for all the constructs used in the data analysis. The SEM analysis of the conceptual framework is described in the next section.

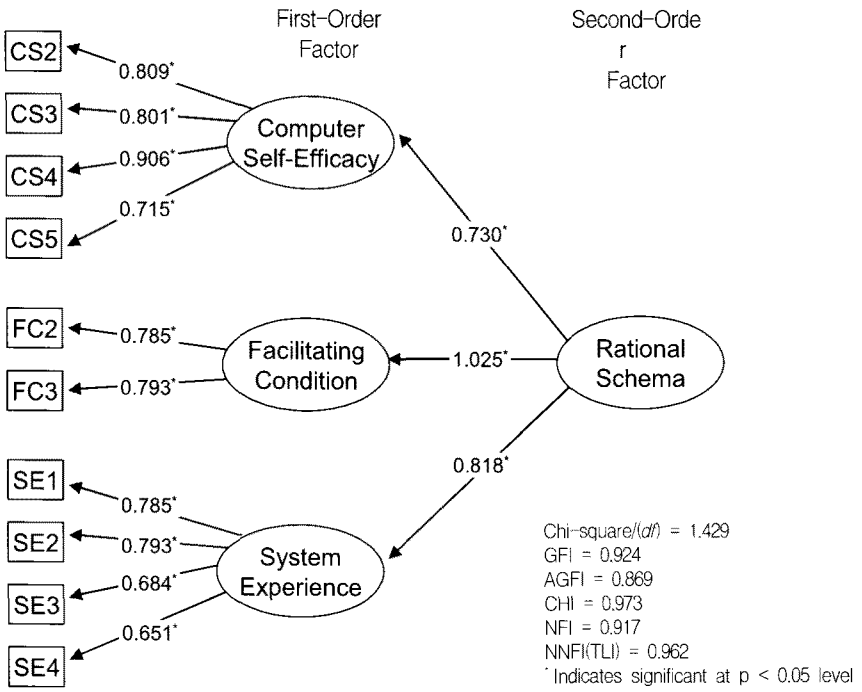
The second step is to apply SEM to the proposed research model, as shown in <Figure 5>. The overall fit measures indicated a fairly good fit (Chi-square/df = 1.391; GFI = 0.890; AGFI = 0.838; CFI = 0.957; NFI = 0.866; NNFI = 0.946). All the path coefficients computed were acceptable at a level of significance of $p < .01$, except one parameter on the path from emotional schema to cognitive fit. The basic premise is that cognitive fit is positively related to the two schemata. However, the issue we are investigating here is whether or not this relationship is concurrently based on the two schemata. <Table 4> shows the correlation matrix of the final measurements.

The third step is hypotheses testing. The experimental results in <Figure 5> show that only one of the two schemata is positively related to cognitive fit at the same time, and thus do not support hypothesis 1. After experiments with other combinations of paths among the two schemata and cognitive fit (for example, either rational schema → emotional schema → cognitive fit, or emotional schema → rational schema → cognitive fit), two findings of note were found: (1) all the fit measures and path coefficients are almost the same, and (2) once one schema is positively related to cognitive fit then the other schema is always denied a significant relation to cognitive fit; i.e., the second schema always supports the first schema which is proved to have a positive relation with cognitive fit. This finding implicitly implies that one of the two schemata is always dominating the other in relation to cognitive fit. Hypothesis 2 is thus significantly supported with a positive coefficient of .452 at the 99% confidence level.

Additional analyses of indirect effects were



(a) Emotional Schema



(b) Rational Schema

<Figure 4> Second Order CFA Results for the Two Schemata Constructs

<Table 3> Properties of Final Measures†

Construct	Item	Standardized Loadings	Indicator measurement error	Construct reliability	Variance extracted
Emotional Schema	CA4	0.815	0.336	0.791	0.559
	CA3	0.649	0.579		
	CA5	0.770	0.407		
	TP4	0.714	0.490	0.759	0.514
	TP2	0.648	0.580		
	TP1	0.782	0.388		
	IN2	0.716	0.487	0.652	0.484
	IN1	0.675	0.544		
Rational Schema	SE5	0.715	0.489	0.884	0.657
	SE4	0.906	0.179		
	SE3	0.801	0.358		
	SE2	0.809	0.346		
	FC2	0.595	0.646	0.679	0.521
	FC3	0.829	0.313		
	EXP3	0.684	0.532	0.820	0.534
	EXP2	0.793	0.371		
	EXP1	0.785	0.384		
	EXP4	0.651	0.576		
Cognitive Fit	CR2	0.829	0.313	0.801	0.577
	CR3	0.814	0.337		
	CR4	0.617	0.619		
Decision Satisfaction	DS1	0.766	0.413	0.894	0.679
	DS2	0.851	0.276		
	DS3	0.816	0.334		
	DS4	0.860	0.260		

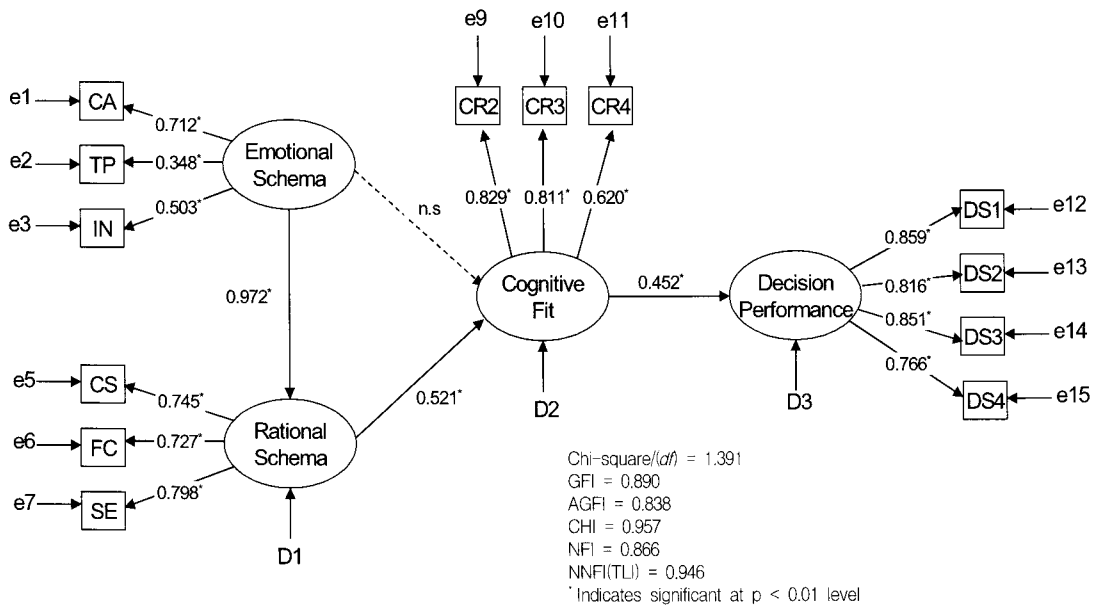
Note) † Construct reliability = (sum of standardized loadings)^2/{(sum of standardized loadings)^2 +sum of indicator measurement error}.
Indicator measurement error = 1-(standardized loading)^2.
Variance Extracted = sum of squared standardized loadings/(sum of squared standardized loadings +sum of indicator measurement error).

conducted to investigate whether emotional schema and rational schema and decision performance through the mediating role played by cognitive fit. As shown in <Table 5>, emotional schema had a significant indirect, positive effect on cognitive fit (β = 0.915, t-value = 2.094, $p < 0.01$). Emotional schema (β = 0.380, t-value = 1.801, $p < 0.01$), and rational schema (β = 0.289, t-value = 2.535, $p < 0.001$) also showed a significant indirect effect on decision

<Table 4> Correlation Matrix Used for Data Analysis

	CA	TP	IND	SE	FC	EXP	CR2	CR3	CR4	DS1	DS2	DS3	DS4
CA	1.000												
TP	0.237*	1.000											
IND	0.344**	0.249*	1.000										
SE	0.467**	0.250*	0.395**	1.000									
FC	0.462**	0.230*	0.349**	0.578**	1.000								
EXP	0.612**	0.284**	0.375**	0.559**	0.593**	1.000							
CR2	0.278**	0.071	0.209*	0.406**	0.249*	0.229*	1.000						
CR3	0.366**	0.073	0.104	0.336**	0.245*	0.254**	0.698**	1.000					
CR4	0.224*	0.003	0.168	0.428**	0.235*	0.304**	0.538**	0.450**	1.000				
DS1	0.387**	0.109	0.267**	0.380**	0.250*	0.379**	0.247*	0.367**	0.245*	1.000			
DS2	0.433**	0.152	0.162	0.356**	0.275**	0.400**	0.244*	0.328**	0.241*	0.673**	1.000		
DS3	0.340**	0.164	0.141	0.311**	0.267**	0.371**	0.241*	0.344**	0.312**	0.749**	0.694**	1.000	
DS4	0.356**	0.110	0.211*	0.377**	0.274**	0.480**	0.113	0.214*	0.293**	0.664**	0.674**	0.619**	1.000

Note) **: P < 0.01, *: p < 0.05.



<Figure 5> SEM Results for the Proposed Research Model

performance.

It is interesting to note that the indirect effect of emotional schema was statistically significant on cognitive fit. This might be attributable to the fact that the indirect effect could be expressed as a shared outcome in which cogni-

<Table 5> Standardized Structural Estimates and Tests of Hypotheses

Path(hypotheses)	Estimates	t-value	Results
Direct effects			
Emotional schema → Rational schema(H_{1-1})	0.972	4.118	Supported
Emotional schema → Cognitive fit(H_{1-2})	-	-	Rejected
Rational schema → Cognitive fit(H_{1-3})	0.521	4.386	Supported
Cognitive resonance → Decision performance(H_2)	0.452	3.993	Supported
Indirect effects			
Emotional schema → Cognitive fit	0.915	2.094	-
Emotional schema → Decision performance	0.380	1.801	-
Rational schema → Decision performance	0.289	2.535	-
R^2			
Cognitive resonance: 0.637(63.7%)			
Decision performance: 0.668(66.8%			

Note) χ^2 = 86.232, df = 62, p = 0.023, RMSR = 0.062, GFI = 0.890, AGFI = 0.838, CFI = 0.957, NFI = 0.866, NNFI = 0.946.

tive was strengthened through rational schema.

V. Discussion

This study aims to examine the effects of emotional and rational schemas on decision performance through the mediation of cognitive fit in an online shopping environment.

As for the hypotheses that emotional and rational schemas have significant effects on cognitive fit (H1), first of all, the results of the study revealed that emotional schemas have significant effects on rational schemas (H1-1). In addition, the effects of rational schemas (H1-3) were significant, whereas those of emotional schemas (H1-2), indicating that H1 is partially supported. The hypothesis about the causal relationship between cognitive fit and decision performance (H2) turned out to be significant.

The effects of emotional schemas on cognitive fit have been rejected in this study due to the high correlation between emotional and rational schemas; when there is a high correlation between two independent variables, the one with greater effects remain significant, while the other is rejected [Hair *et al.*, 1998). However, multicollinearity was not observed despite the high correlation between the two, suggesting that there were not statistical problems. In addition, emotional schemas turned out not directly wholly insignificant as a further analysis of the indirect effects revealed that emotional schemas did not have significant effects on cognitive fit but had indirect effects through the mediation of rational schemas. Therefore, there is a need of further studies of the relationship between emotional schemas and cognitive fit focusing on various situations.

The results of this study have the following implications from the theoretical and practical aspects.

First of all, theoretically, this study divided the key bases for decision-making into an emotional schema and a rational schema and suggested empirically that the fit of the two factors increases the decision performance. Since emotional schemas have been rejected in this study, additional studies of this issue are needed. Moreover, this study would make a contribution to future studies by defining emotional and rational schemas as the second order factor and suggesting the sub-dimension based on existing theories.

The practical implication of this study is that people consider emotional and rational aspects at the same time when performing decision-making. Personal schemas in online shopping can be considered from the aspect of transaction as follows.

Rational aspects of transactions (which is assessed by "rational schema") are related to perceived ease of use, efficiency, convenience, and usefulness, while the emotional aspects of transactions (which is assessed by "emotional schema") are associated with desirability, fun, pleasure, and joy which are experienced in transactions.

Therefore, in order to gratify rational schemas, online shopping mall marketers, therefore, should take account of functional aspects, such as the shopping mall's ease-of-use, efficiency, convenience, and usefulness. Moreover, they are not to neglect sensory aspects, such as desirability, fun, pleasure, and joy in order to satisfy emotional schemas.

6. Concluding Remarks

With the advent of the Internet age, many researchers investigating electronic commerce have proposed a variety of methods to explore the techniques and reasons exhibited by users in terms of their specific attitude, behavioral intention, and satisfaction with Internet shopping sites. However, to the best of our knowledge, no studies in the literature have reported how the emotional and rational aspects of a user's perception that are deeply buried in his/her psychological realm create the cognitive fit which leads directly to the decision performance exhibited in Internet shopping.

To conduct this pioneering research, we borrowed a basic metaphor from the theories TRA, TPB and TAM, all of which attempt to rationalize the behavior of users in a specific decision-making situation. We introduced three new constructs: emotional schema, rational schema, and cognitive fit. As emotional and rational schemata are too complicated to be operationalized precisely in the case of Internet shopping, we successfully applied second order CFA analysis. The valid items representing cognitive fit were also proven by CFA to include three decision properties, namely reliability, confidence and consistency, which are thought to be derived when a desirable decision is made. The CFA results for the constructs used in our proposed research model all showed fairly good fit measures with all path coefficients being valid at $p < .01$ except one on the path between emotional schema and cognitive fit. The proposed research model was thus validated statistically from an overall viewpoint. We concluded that hypothesis 1-2 was rejected, implying that only one of the two schemata is positively related to cognitive fit at

any one time, and that hypothesis 2 was strongly supported.

This study has some limitations. First, the measurement of personal schemas regarding decision-making might have been inaccurate since this study surveyed students only. Second, the number of samples, 104, seems rather insufficient for structural equation modeling. Lastly, as the domain of this study was restricted to an online shopping environment, it is necessary to study how the framework of this study functions in various decision-making environments.

The remaining research issues worthy of further analysis are an investigation of more relevant constructs able to describe the two schemata in a specific application domain and a refinement of items for cognitive fit.

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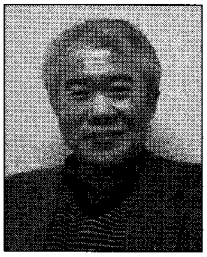

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