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How objective and subjective knowledge affect insurance choices

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ABSTRACT

This study investigates the effect of objective knowledge (OK) and subjective knowledge (SK) on real-life insurance choices, a non-trivial, information rich choice task with no dominant option. Prior research has shown that OK and SK tend to be correlated, but that is not always the case. By using a novel approach to manipulate SK – which could be adapted by salespeople in real-world contexts – we ensured that levels of SK and OK were not always in accord. Clear patterns emerged showing an inverse relationship between SK and OK, and the number of problem framing (or structuring) related statements made, number of overall information processing operations performed, and the time spent to reach a decision. Most of the extra effort expended by low SK/ low OK individuals was spent framing the problem, not executing decision rules such as making attribute comparisons. Those with high OK were also less prone to misunderstanding product information. Whether high or low SK/OK, there were no differences in final choices, suggesting that neither group jumped to a simplifying choice heuristic. Instead, those low in knowledge compensated for this deficiency by taking more time framing the problem and reaching a thoughtful decision, a decision strategy that weakens the effect of branding.

Keywords: objective/subjective knowledge, information processing operations, verbal protocols, insurance

INTRODUCTION

The type of knowledge one has stored in memory influences consumers' cognitive processes and decision outcomes. Objective knowledge (OK) represents the amount, type (such as declarative versus procedural knowledge) and/or organization of what an individual has stored in memory about a domain or product. OK has been shown to have an effect on the amount of information acquired (Bettman and Park, 1980b; Brucks 1985; Mishra and Kumar, 2011; Spence and Brucks, 1997), the type of information acquired (Carlson, Bearden and Hardesty, 2007), information acquisition strategies (Bettman and Park, 1980a; Bettman and Sujan, 1987), and the time needed for processing task related information and reaching decisions (for opposing views, see Johnson, 1988, and Spence and Brucks, 1997).

However, OK is not the only factor that influences consumer's decision-making. Subjective knowledge (SK) – how much an individual thinks they know about a particular domain – is also an influential criterion. SK has been shown to have an effect on consumers' decision time (Park and Lessig, 1981), how product information is used (Hadar, Sood and Fox, 2013), what information is acquired (Brucks, 1985), and the importance attached to various pieces of information (Park, Gardner and Thukral, 1988). In spite of these SK related insights, it is surprising how little is known about how SK and OK differentially affect decision making (Hadar et al., 2013; Mishra and Kumar, 2011; Moorman, Diehl, Brinberg and Kidwell, 2004; Raju, Lonial and Mangold, 1995).

In this paper, our goal is to investigate how OK and SK affect consumers' decision-making processes when choosing between five real-life house insurance policies, a non-trivial,

information rich choice task with no dominant option. We are not the first to compare and contrast OK to SK (for a meta-analysis addressing the correlation between these two constructs, see Carlson, Vincent, Hardesty and Bearden, 2009). Generally these two constructs are correlated (Carlson et al., 2009), thus clouding the ability to discern differential effects (Mishra and Kumar, 2011; Raju et al., 1995). However, OK and SK need not be in concert. For example, Hadar et al. (2013) found that raising OK can have the paradoxical effect of lowering one's SK. Over- or under-estimating one's knowledge level is not uncommon, although the tendency is to overestimate (Alba and Hutchinson, 2000). To reveal process and performance differences, most studies start with between group differences, such as comparing experts to novices (Johnson, 1988; Spence and Brucks, 1997; Ackert, Church and Tkac, 2010), control for one while manipulating the other (Hadar et al., 2013), or measure OK/SK, not manipulate it (Mishra & Kumar, 2011; Raju et al., 1995). Studies in the finance domain are in short supply (Hadar et al., 2013; Jacoby et al., 2001; Kuusela, Spence and Kanto, 1998; Mishra and Kumar, 2011). Herein we manipulate both OK and SK to achieve a balanced 2x2 (low/high SK by low/high OK) experimental design to unearth their relative effects.

We start by reviewing relevant literature on objective knowledge (OK) and subjective knowledge (SK) on consumer decision making performance. Next we conduct an experiment to assess direct and interactive effects of OK and SK on consumer information processing operations when selecting an insurance policy. By analyzing coded think-aloud verbal protocols, we explore how participants with high and low OK / SK frame or structure the decision task, how they process the provided information, and how much cognitive effort is expended to complete the task (measured in time spent problem solving and total information processing operations). Conclusions and limitations complete the paper.

CONCEPTUAL BACKGROUND

A clear distinction between OK (or objective knowledge) and SK (or self-perceived knowledge) has been established in the literature (for a review, see Alba and Hutchinson, 2000). OK accumulates principally through a long-term learning process whereas SK represents a person's situation-bound assessment of his or her knowledge. Moorman et al. (2004) point out that OK and SK are: 1) distinct constructs with unique measures (Brucks, 1985); 2) may affect consumers' search and choice behavior differently (Radecki and Jaccard, 1995; Raju et al., 1995); and 3) have different antecedents (Park, Mothersbaugh and Feick, 1994; Radecki and Jaccard, 1995). Carlson et al. (2009) conducted a meta-analysis comparing the correlation between OK and SK and found that correlations ranged from -0.15 to 0.68, with an average correlation of 0.37. The variance in correlations between these constructs was partially explained by product related characteristics (e.g., search versus experience goods) as well as how OK and SK were measured.

Broadly speaking, an individual can fall into one of four categories: they correctly assess that their actual knowledge is low (low SK, low OK) or high (high SK, high OK), or they overestimate their domain specific knowledge (high SK, low OK), or they underestimate their knowledge (low SK, high OK). When levels of OK and SK correspond the individual "knows what they know", whether or not that level of knowledge is high or low. However, when an individual believes their domain specific knowledge is high when in fact objective measures reveal their knowledge is low, there is an 'illusion-of-knowing' (Glenberg, Wilkinson and Epstein, 1982; Radecki and Jaccard, 1995). Naturally, falling prey to false confidence, or pseudo knowledge, can lead to poor judgments (Mehta, Hoegg and Chakravarti, 2011). Conversely, an

individual with high OK may perceive herself as less knowledgeable than they actually are, an 'illusion-of-not-knowing'. Hadar et al. (2013) flags an interesting paradox: programs designed to educate consumers (raise OK), such as providing elaborate mutual fund related information, may inadvertently lower SK. In one of their studies this paradox led to decreasing investments in the fund that provided more elaborate information.

Hadar et al. (2013, p. 305) comment that OK "is more strongly related to ability and expertise, whereas SK is more strongly related to product-related experience and consumers' confidence in their ability to make effective decisions". Interestingly, there is not a consensus as to how either of these affect information search. One view is that a low self-assessment of one's knowledge (low SK) increases one's motivation to learn more than a high self-assessment, especially when the complexity of the problem-solving task does not exceed one's capability to solve the problem. If true, a negative relationship exists between one's knowledge level and the amount of information search. This is consistent with studies on learning that have revealed that the illusion of knowing may be a major obstacle to effective learning (Glenberg et al., 1982).

However, other researchers have found support for a positive relationship between one's knowledge level and information search (Mishra and Kumar, 2013; Raju et al., 1995). A view reconciling these disparate perspectives is that there is an inverted-U relationship between information search and one's knowledge level. There is initially a positive relationship between search effort and knowledge level, however, as problems become increasingly complex such that they overwhelm a decision maker's ability, or the problem is trivial relative to the decision maker's knowledge, effort expended to solve the problem can decrease. There is support for an inverted-U search effort → knowledge relationship (Brucks, 1985).

Barring trivial choices, consumers often do not have complete rules or heuristics stored in memory for decision making. Payne (1976; Payne and Bettman, 1992; Bettman, Luce and Payne, 1998) found that the use of different choice heuristics is contingent upon the choice task. Research guided by this contingency perspective has examined relatively stable properties of the decision environment, such as time pressure. For example, Payne and Bettman (1992; Ackert, Church and Tkac, 2010) reported that under severe time pressure people tend to accelerate their processing and focus on subsets of information compared to if they had more time. With respect to task characteristics, studies have found that if a decision involves only two or three alternatives each with limited information individuals may use relatively complicated compensatory decision strategies; but in more complex environments (many options and/or attributes) they instead invoke simpler, non-compensatory strategies (Bettman, Johnson & Payne, 1990; Payne, 1976). Collectively, studies such as these have shown that consumer decision-processes are influenced by both content (e.g., the amount, type and format of information) and contextual factors (such as time pressure). Importantly, these examples demonstrate that people are capable of consciously and actively controlling their decision processes.

It stands to reason that in contingent choice tasks there is much room for both OK and SK to influence decision making. For example, Hadar et al. (2013) noticed that those with high SK were more willing to pursue risky investments. In a study investigating differences in problem solving strategies as a result of expertise (OK), Kuusela et al. (1998) found that experts invoked more complex compensatory decision rules and were less prone to misunderstanding information than were novices, the latter partially explaining the greater variance in novices' choices. They did not, however, explore SK.

Development of the hypotheses

The following discussion pertains to what for most people is a novel, non-trivial problem: selecting from a set of real-world home insurance problems. Problems such as these can be classified as initially ill-structured, but structurable (Spence and Brucks, 1997). It is at a mid-range level of problem complexity, between well-structured and inherently ill-structured problems, that high versus low OK differences are expected to be realized. This is because in the case of simple problems less knowledgeable individuals may perform as well as experts, whereas in the case of inherently ill-structured problems, such as long range forecasting, even experts are likely to have widely differing opinions (Spence and Brucks 1997). To solve non-trivial problems requires two broad actions: setting up or framing the problem (imposing a structure onto the problem), and then having done so invoke idiosyncratic decision rules, such as comparing alternatives across attributes.

Participants with high OK tend to have more richly formatted information domain specific schemata (Chi, Feltovich and Glaser, 1981; Chi, Glaser and Farr, 1988, 2014). As familiarity with the issue under consideration increases, individuals' knowledge becomes more cohesively organized and the links between different concepts become stronger and more numerous (Fiske, Kinder and Larter, 1983). More knowledgeable participants can encode, categorize and make sense of large amounts of information more efficiently (Cokely, Kelley and Gilchrist, 2006). They are also more flexible and selective in their use of external information (Johnson, 1988). This selectivity means that in decision environments with large amounts of information, experts tend to use less information – they are more likely to know what information is important and choose accordingly (Spence and Brucks, 1997). They can more

quickly impose a structure onto the problem at hand relative to less knowledgeable decision makers, which guides information search. Investigations have shown that expertise is very much domain-specific (Chi et al., 1988).

With these insights, we advance an overarching 'ability to process' hypothesis that suggests that participants with high OK can more quickly impose a frame (structure) onto the problem at hand, and are more efficient (selective) at acquiring externally available information. It is reasonable to assume that they would be less prone to misunderstanding information than would low OK participants (Kuusela et al., 1998). Collectively, they would be faster at problem solving. Thus,

H1: Low OK individuals, relative to high OK individuals, will:

a) *spend more time solving the problem;*
b) *engage in more overall Information Processing Operations (IPOs);*
c) *engage in more problem framing related activity;*
d) *be more prone to misunderstanding provided information.*

People with high SK may erroneously think they have appropriate domain relevant knowledge, an illusion of knowing (Glenberg et al., 1982). Assuming the task is non-trivial, high SK individuals are likely to expend less effort than if they had low SK. Being self-assured, they may feel that little effort is required to resolve the decision at hand. Conversely, low SK is likely to heighten one's motivation to more carefully process task relevant information. Given their self-acknowledged lack of domain-specific expertise, they are likely to expend more effort 'figuring out the problem', that is, framing or structuring the problem in order to enhance clarity regarding the issue at hand. They are likely to be relatively more thorough and exhaustive in their information processing than those with high SK. Based on the above, we present an overarching 'increased effort' hypothesis. Thus,

H2: Low SK individuals, relative to high SK individuals, will:

a) spend more time solving the problem;
b) engage in more overall Information Processing Operations (IPOs);
c) engage in more problem framing related activity.

Barring the lack of a position concerning 'misunderstandings' due to SK, H1 and H2, if supported, would suggest that OK and SK have similar ramifications despite the fact that the drivers of behavior are different: OK has to do with real and relevant problem related schemata whereas SK has more to do with perceived ability and motivation. Some have found support for the constructs being seemingly interchangeable (Mishra and Kumar, 2011), but others have found differential effects (Radecki and Jaccard, 1995; Raju et al., 1995, albeit some effects were directional). Even if the effects of OK and SK parallel each other, a question still remains about the relative size of the effects caused by OK and SK. Furthermore, what happens if the level of OK and SK are not in accord (i.e., low SK/high OK or high SK/low OK)? Our supposition is that motivation, driven by SK, has a stronger effect than does ability, driven by OK. If so, this would suggest that:

H3: Low SK/high OK individuals, relative to high SK/low OK individuals, will:
a) spend more time solving the problem;
b) engage in more overall Information Processing Operations (IPOs);
c) engage in more problem framing related activity.

The number of misunderstanding would still be driven by OK levels, thus lower in the low SK/high OK condition relative to the high SK/low OK condition. Collectively, the hypotheses being tested are encapsulated in Table 1.

<< insert TABLE 1 about here >>

RESEARCH METHODOLOGY

Study overview

Sixty-four business students, aged 20 to 29, were selected from two Finnish Universities. Participants were informed that they would be completing a decision making task that would take about an hour, and were offered €10 for their participation. These subjects were randomly assigned to one of four treatment conditions. The study examines the effect of two manipulated explanatory variables, subjective knowledge (SK) and objective knowledge (OK), on six dependent variables: framing related statements, holistic evaluations, attribute level comparisons, misunderstandings, other (including choice related statements) and decision time. A seventh variable, the sum of all these information processing operations (IPOs), was also analyzed.

Decision making context

Several criteria were considered when choosing an appropriate decision making context. First was external validity. The decision task, selecting a residential insurance contract, represented a decision most individuals would be expected to make in their lifetimes, but not one done frequently, hence would have a low level of familiarity. Such problems are likely to involve extended decision making. Data provided were based on real-world insurance policies offered from five different companies, although the quantity of data was held constant across alternatives. Second, we wanted a decision context that OK could vary significantly. The two universities from which participants were selected both had insurance related courses. Third, the decision target was chosen to be neither too easy nor too demanding – to be ill-structured, but structurable. The purpose was to ensure that there was an opportunity for participants' SK and OK to come into play. Fourth, the decision could be made without the participants requiring prior knowledge about the alternatives.

The terminology used in product descriptions was essentially the same as in the product displays found in insurance offices or on the internet, although persuasive and evocative expressions were excluded. For each alternative, there was information on ten insurance attributes/items, such as scope of coverage, items and events not covered, sum insured, and premium (see Appendix B for the complete list). For four of the attributes the information was held constant across all five insurance policies, thus the offerings differed on the remaining six dimensions. Like the real-world, there was not a dominant option.

The Procedure

Data collection consisted of three parts. First, we conducted the SK experimental manipulation. Second, we collected the simulated purchase situation data using a concurrent verbal protocol technique. Third, we gave the participants a concluding questionnaire.

SK was manipulated using a two-step process. First, all participants were requested to answer multiple choice questions about insurance specific facts and terminology; however, the questions differed in their level of difficulty. Participants in the high SK group received ten easy true-false questions, involving general knowledge about insurance-specific facts and terminology, whereas the participants in the low SK condition received ten difficult true-false questions involving insurance specific facts and terminology. The items in the questionnaire were not used in the subsequent experimental choice task.

After they answered the questions, feedback was provided to the participants (Park et al., 1988; Park et al., 1994). To amplify SK, the participants who answered the relatively easy questions were given positive feedback. These participants were told that their responses were 100% correct, and were praised for their superb performance and high level of product knowledge. They were informed that less than 5% of respondents provide a 100 % correct

response. By providing such positive feedback, the participants were encouraged to assess their level of domain knowledge 'highly'. On the other hand, participants in the low SK condition were given negative feedback. They were told, regardless of their actual performance on the relatively hard true-false questions, that they had done very poorly and that much information had to be mastered by them before they could understand the product class. To ensure that the participants were not disheartened and that they would continue to participate actively, they were assured that such knowledge was not a prerequisite for the study. Collectively this two-step manipulation process allowed participants to perceive gaps in their knowledge and to create the phenomenon we were striving to generate: the illusion of knowing or the illusion of not knowing.

Regarding OK, the low OK group consisted of students who had never taken an insurance course, whereas the high OK group consisted of students who had taken at least one insurance course. Given these two means to manipulate subjective and objective knowledge levels, a balanced 2x2 design could be achieved. This is an important departure from prior work and ensures that half the subjects have a positively correlated OK/SK relationship and half do not. Hadar et al. (2013) demonstrate that providing more financial training can paradoxically decrease one's SK, which in turn was shown to have deleterious choice related consequences. In their studies OK was held constant or controlled; herein the design is balanced, thus allowing the ability to separate SK from OK effects. Further, the focus herein is on decision processes rather than choices, because there was not a correct choice.

In the second part, participants provided verbal concurrent protocols while selecting an insurance policy. They were given the following instructions: "Consider that you are an unmarried person in possession of a condominium of two rooms and a kitchen in a multistory apartment building. Your apartment is 50 m^2 in size, and insurance companies have estimated its

insurable value at € 20,000. According to the companies, you don't own personal property (e.g., collections, art, jewelry) that would cause particular policy considerations. Your property is thus ordinary." Participants were then told, "The insurance companies (referred to A, B, C, D and E to remove any brand name effects) have made their offers as described in the following. I will present them to you, and you are to select one among them. When you are making your decision, I will ask you to think aloud, i.e., verbally report all your thoughts, arguments, and whatever occurs to you while you are making your decision. It is very important that you report all your thoughts emerging in making the decision."

Participants were interviewed one at a time; there was no time constraint. Protocol data are stated cognitions, a rationalized decision process. It is reasonable to assume that in real-life first time insurance related decisions are thoughtfully made and not driven by overly simplistic decision heuristics. Three participants expressed difficulty with verbally reporting their thoughts during the task and were therefore dropped and replaced to keep the design balanced. Participants' think-aloud protocols were recorded for the purpose of analysis (for a review of protocol data, see Ericsson, 2006).

After the verbal protocol task, manipulation checks were taken for both SK and OK. There is no agreed upon means to assess SK (Carlson et al., 2009) although OK is traditionally measured by a multiple choice test. Herein, to tap SK respondents answered seven 5-point semantic differential scale questions, such as "How good is your familiarity with the concepts and terminology of homeowner's insurance?" For OK, participants answered 20 "what is meant by" questions about terminology and facts about homeowner's insurance.

ANALYSIS AND EMPIRICAL RESULTS

Manipulation checks

The seven measures used to tap SK were summed to form a single construct (Cronbach alpha = .84). As anticipated, those in the low SK condition had significantly lower mean scores than did those in the high SK condition (means = 22.44 versus 25.00, $t = -2.44$, $p = .017$). Similarly, those that had not taken an insurance course (low OK condition) scored significantly lower on the 20 question exam (maximum possible score equaled 30) than did those in the high SK condition (means = 18.56 versus 22.34, $t = -4.73$, $p < .01$).

Protocol analysis

The tape recorded protocols were first transcribed and then broken into a sequence of task relevant information processing operations (IPOs), and then coded by two independent judges. These judges performed the coding after four-days of practice on sample transcripts and were blind about the purpose of the study and the treatment conditions. The coding procedure involved coding 4,965 IPOs. The inter-coder agreement rate was 94 % and ambiguities were resolved through mutual discussions. Sample comments representative of the different coding categories are shown in Appendix A. Frequencies of thoughts by category appear in Table 2.

<< Insert TABLE 2 about here >>

The Dependent Variables

The first two analyses explore the effect of SK and OK on decision processes at a high level, namely overall decision time in minutes and the total number of information processing operations. Not surprisingly, decision time and total IPOs are correlated ($r = .442$, $p = .01$). Research to date regarding the time required to solve problems is mixed, albeit the general

finding is that 'experts' can solve problems faster than can less knowledgeable decision makers (for differing views, compare Spence and Brucks, 1997, to Johnson, 1988). Findings from a 2x2 ANOVA with time-in-minutes the dependent variable supported the supposition that more knowledgeable decision makers, whether perceived (high SK) or real (high OK) solved the problem faster: there was a significant main effect for SK ($F(1, 60) = 8.709$, $p = .005$, partial $\eta^2 = .127$) as well as for OK ($F(1,60) = 18.871$, $p < .01$, partial $\eta^2 = .239$). The two-way interaction was not significant ($p = .50$). (These values were essentially unaffected if the natural log of time was used as the dependent variable instead of elapsed clock time.) Thus, OK is exhibiting a large effect size on decision time and SK a medium effect size (Cohen, 1988). Thus, both H1a and H2a are supported. A perusal of each cell's mean (see Table 2) indicates that the time to complete the task increases steadily from high SK/high AK (HH = 15.63 minutes) to low SK/low AK (LL = 28.06 minutes). Post hoc analyses using Least Significant Differences reveal several significant differences (LL is significantly different and higher than all three remaining conditions (all p's <.013), and HL is significantly different and higher than HH ($p = .012$)). However, the data does not lend support for H3a, that there would be a significant difference between LH (low SK and high OK) and HL.

An analysis of total information processing operations (IPOs) largely echoes the findings of decision time: the main effect of SK is ($F(1, 60) = 10.519$, $p = .002$, partial $\eta^2 = .149$) and for OK ($F(1,60) = 7.071$, $p = .010$, partial $\eta^2 = .105$). In this case, SK is exhibiting a somewhat larger, medium effect size relative to OK than was the case with total decision time. The two-way interaction is not significant ($p = .556$). H1b and H2b are therefore supported. As can be seen by the cell means (Table 2), the big jumps in IPOs are from HH, LH and HL to LL (all three post

hoc two-way comparisons are significant (all p's < .026); no other pairwise comparisons are significant (p's > .05). H3b is therefore not supported.

With this overall picture as a backdrop, subsequent analyses explore the components that make-up total IPOs. Researchers differ regarding how to categorize IPOs (Bettman and Park, 1980a; Johnson, 1988; Jacoby et al., 2001), but problem resolution is acknowledged as a multistep process requiring identifying what issues and which inputs to consider – what we call 'framing the problem' – and then evaluating and integrating the selected inputs to reach a decision (Spence & Brucks, 1997). Problem framing activity included statements regarding their plans or needs, posing questions to themselves about alternatives, or familiarizing themselves with the data provided, such as reading but not comparing the values of attributes. A 2x2 ANOVA was therefore run with framing the dependent variable and SK and OK the independent variables. Both main effects were significant in the predicted direction ($F(1, 60) = 10.418$, $p = .002$, partial $\eta^2 = .148$ for SK) and ($F(1,60) = 4.854$, $p = .031$, partial $\eta^2 = .075$ for OK), thus suggesting a medium effect size for SK and a small to medium effect size for OK. H1c and H2c are therefore supported. The two-way interaction was not significant ($p = .680$).

Post hoc pairwise comparisons across the four conditions revealed that the significant differences are largely driven by the difference between high SK/high OK (HH condition, mean = 26.44) and low SK/low OK (LL condition, mean = 62.88, $p < .01$). There was no significant difference between LH and HL (means = 45.31 and 38.44, respectively, $p = .472$), thus H3c is not supported. It appears that when there is an inconsistency between what individuals think they know versus what they actually know, it does not matter whether they over- (HL) or under-estimate (LH) their actual knowledge. Overall, knowledgeable decision makers can more quickly impose a structure onto the problem and start solving the insurance task problem (i.e., make

product comparisons), whereas less knowledgeable decision makers spend more effort setting-up the problem, thinking through their needs and getting an understanding on what types of information are available (Chi, Feltovich and Glaser, 1981; Spence and Brucks, 1997). Interestingly, differences in the number of problem framing statements across the four conditions largely explain the differences in total IPOs. Excluding problem framing, there are statistically significant differences between the four groups in the remaining IPOs ($F(3, 60) = 3.186$, $p = .030$), with the means trending-up gently from HH (mean = 28.1) to LL (mean = 40.9).

The next analyses explored misunderstandings. The overall ANOVA was significant ($F(3,60) = 4.023$, $p = .011$); this was driven by a significant main effect for OK in the anticipated direction (mean = 3.19 for low OK and 1.06 for high OK, $F(1, 60) = 11.055$, $p = .002$, partial $\eta^2 = .156$, medium OK effect size). Neither the main effect for SK nor the two-way interaction was significant ($p > .38$). H1d is therefore supported. Post hoc analyses revealed no significant differences between the two high OK conditions (HH and LH, $p = .337$) and the two low OK conditions (HL and LL, $p = .783$). However, there was a significant difference between LH and HL (means equal 0.63 and 3.31 respectively, $p = <.01$). Low objective knowledge is driving up misunderstandings.

No specific hypotheses were proposed regarding holistic processes, attribute comparisons or 'other processing operations', although these categories of processing operations have been explored in expert/novice comparisons (Kuusela et al. 1998). Holistic processes refer to overall evaluations of alternatives and are non-analytical in nature. Research has shown that experienced consumers tend to use fewer items to evaluate products and rely more heavily on global evaluations (Bettman and Park, 1980a; Park and Lessig, 1981). Although experience is not the same as OK (Brucks, 1985; Raju et al., 1995), these findings are consistent with the 'ability to

process' hypothesis which would suggest that the number of holistic processes would be positively related to OK. However, the resultant ANOVA model was not significant ($F(3, 60) = 1.152$, $p = .336$). Cell means across the four conditions appear in Table 2.

The ANOVA exploring the effect on attribute comparisons by SK and OK was significant ($F(3, 60) = 2.805$, $p = .047$). This was driven by a significant main effect for SK ($F(1, 60) = 7.665$, p .007, partial $\eta^2 = .113$). Neither the main effect for OK nor the two-way interaction were significant ($p > .40$). High levels of SK significantly lower the number of attribute comparisons, but there is no discernable pattern concerning the effect of OK. Attribute comparisons are more complex and effortful decision processes than are, for instance, using holistic processing. These findings suggest high SK participants used less complex decision rules (attribute comparisons) than those with low SK. Post hoc LSD analyses revealed two significant pairwise differences: HH versus LL (means = 13.44 versus 21.31 respectively, $p = .013$) and HL versus LL (means = 14.88 and 21.31, $p = .041$). The mean for LH was 19.06, marginally significantly different from HH ($p = .073$).

The ANOVA analysis addressing the 'other' category, which included choice related statements, revealed no significant differences ($F(3, 60) = 1.787$, $p = .159$).

Effect of knowledge structures on choice

The five insurance policy options comprising the decision task were all based on real-world offerings. Thus, unlike studies that have an underlying measure to assess the goodness of decision making, such as fund performance or adherence to specific strategies (Ackert et al., 2010; Hadar et al., 2013; Jacoby et al., 2001), herein there was no correct choice: each policy has strengths and weaknesses relative to the alternative offerings. No speculation was therefore made as to how SK or OK would affect final choices.

Table 3 provides frequency counts of the five choices by the four treatment conditions. Two insights emerge: 1) there is no statistically significant difference between groups ($p > .05$ even if choices are combined to remove cells with counts of zero); and 2) choices were concentrated in three of the five offerings.

<< insert Table 3 about here >>

DISCUSSION AND CONCLUSIONS

Two overarching theories motivated this study: the 'ability to process hypothesis', driven by OK, and the 'increased effort hypothesis', driven by SK. The 'ability to process hypothesis' received widespread support: high relative to low OK subjects were faster at solving the problem, engaged fewer overall information processing operations, spent less effort framing the problem, and were less likely to misunderstand information. Information processing operations (IPOs) provide an extensive, componential view of underlying decision processes (Bettman et al. 1990). Herein those with high OK invoked one third fewer IPOs than did those with low OK (65.6 versus 87.8), and much of that difference could be explained by fewer framing related statements (35.9 versus 50.7). This provides more direct insight that a benefit of expertise is the ability to impose structure onto ill-structured, but structurable problems (Spence and Brucks, 1997). However, there is no indication that choices were systematically affected by high versus low OK. Systematic differences would suggest that a common – and most likely simplistic – decision rule was used. This does not appear to be the case.

With respect to subjective knowledge, there was an inverse relationship between SK and effort expended as measured by IPOs, which is consistent with our 'increased effort hypothesis'. Generally, SK and OK tend to be correlated (Carlson et al. 2009), but this does not need to be the

case. The SK/OK manipulations in our study allowed us to create both consistency and divergence with existing research, which is one of the major contributions of this study. Our supposition was that a low assessment of one's knowledge would stimulate them to work harder in order to better comprehend the situation. Empirical findings supported this view. Those low in SK expended more effort framing the problem, spent more time reaching a decision, and invoked a greater number of IPOs. This poses a conundrum to marketers of less well known products as well as those selling a range of complex options, both of which could apply to insurance companies as well as a vendors of other financial offerings: thoughtful decision making would be desirable, yet the higher one's knowledge level, whether real (OK) or imagined (SK), the less the cognitive effort expended.

Hadar et al. (2013, study 3) found that providing technical and elaborate mutual fund information lowered SK and reduced the number choosing the elaborated option, which for the affected fund is certainly undesirable**.** In their study, all student subjects had completed multiple courses in finance and economics, yet the addition of just a few more technical product related sentences was sufficient to raise self-doubt (lower SK) and alter choice. The authors (Hadar et al. 2013, p. 313) comment that, "we do not propose that financial education programs should be abandoned. Instead, we argue that financial educators should pay special attention to their impact on consumers' SK about what they have learned". Given the insights gleaned from our study, it is prudent to assume expertise – whether real or imagined – will reduce information processing, hence marketers must think carefully about how to present information (to ease problem framing) as well as whether some product features are highlighted to encourage the processing of critical features at the possible expense of overlooking other features.

In an environment with an objective performance measure (ROI), Jacoby et al. (2001) showed that novices are capable of learning a small number of decision inputs to access (in their case, four) when assessing a stock's potential and that this improved their stock portfolio performance, although participants were not restricted to just four pieces of information. Insurance does not have such an objective performance measure, nevertheless insurance companies could facilitate information acquisition and processing by posing questions to direct search and possibly reduce the choice set if a provider offers an array of options (e.g., "Do you have personal valuables in excess of € _____?"). Insurance decisions, whether home, health or automobile, are for many individuals complex decisions and are often made with assistance from salespeople. Personal selling is flexible; sales messages can be adapted to specific customer's needs and beliefs, thus providing an opportunity for salespeople to influence both SK and OK consciously and systematically. Here we showed that SK can be manipulated by the complexity of the questions asked of decision makers as well as by how one reacts to responses. It seems reasonable to assume that a salesperson could easily rectify the 'raising OK can decrease SK' paradox flagged by Hadar et al. (2013).

Furthermore, while the effect of OK and SK is well known to decrease decision making efforts, our study demonstrated their effects separately (by segregating them via our experimental design). This implies salespeople can choose to increase or decrease customers' OK and/or SK effectively that can render different levels of decision making efforts as well as different levels of dependence on the salespeople's expertise. However, as our study found, SK does not always trump OK. This means salespeople must pay attention to the OK level of their customers if they are to enhance/reduce their SK.

Our findings are both consistent with and different from, those of Mishra and Kumar (2011). Similar to their findings, we noticed both OK and SK had similar effects; however, contrary to their findings we found an *inverse* relationship between OK and SK, and decision effort (time, IPOs, and framing statements). In their study on mutual fund decisions, decision processing was assessed by having subjects rate pre-determined features, such as their intentions to use a broker (to tap information search) or how much they would use specific pieces of information, such as reputation of fund manager (to measure depth of processing). Our study is more natural. Decision makers spoke aloud as they made their decision, a common means to unearth decision processes (c.f., Bettman and Park 1980b; Brucks 1985; Ericsson 2006; Kuusela et al. 1998). While verbal protocols can be criticized for encouraging rationalization of one's decision making, it does not draw attention to specific features – features that may have never been considered – or provide any indication to an appropriate decision strategy. Range effects are an alternative explanation for why our insights differ from Mishra and Kumar (2011), given that an inverted-U relationship between knowledge levels and search has received support (Brucks 1985). What was presented to participants here is consistent with the real-world: most individuals rarely consider more than five options, the number of options presented herein; and the option-related information at their disposal was taken from marketing material for those products. There was no correct strategy or a correct choice.

Limitations and Future Research

Information not provided within our experiment were the brand names. Sinn et al. (2007) found that the relative familiarity of brands within a choice set can reverse the compromise effect. If the middle option was less familiar, the compromise effect was mitigated. However, if one option was superior to another (information on four attributes was provided), the effect of brand

familiarity on choice was diminished. The authors raise an intriguing unanswered question (Sinn et al. 2007, p. 233): "More generally, the question is when are consumer choices driven more by brand characteristics than by a comparison of the relative attribute positions of each alternative (i.e., when do brands matter)?" While they did not assess either OK or SK, it appears that decision makers in their study 2 carefully considered the provided attribute information to discern product differences (thereby identifying the superior option), which would be more consistent with the actions of low SK or low OK individuals. However, relying on brand names is a simplifying choice heuristic often invoked in low involvement, habitual decision making contexts, which does not characterize insurance decisions, at least in reference to the first time an individual has to make such a decision. Recall there were no differences in choices due to treatment condition which suggests there was not commonality in decision rules used.

Another avenue to consider is how consumer decision making is affected by on-line opinions. Simonson and Rosen (2014) propose that there is a zero-sum game between consumers relying on their prior preferences/personal experience, marketer controlled information (studied herein) and other people's opinions – the latter vastly increasing in popularity given the proliferation of on-line rating websites. Relying more on one of these three sources of information when making decision suggests a diminished role for one or both of the others. Many of us probably look at user ratings of hotels or restaurants to make a choice; but how about when choosing on-going and financially committing relationships, like insurance? Our insights found high SK and high OK led to less effortful decision making. Would this mean a greater willingness to seek and incorporate on-line opinions? That seems counter-intuitive given their real or perceived expertise.

Despite studies measuring differences in types of consumer knowledge and insights regarding their relative effects referenced within this manuscript, research on financial services is sparse (Braunsberger et al. 2004; Hadar et al. 2013; Mishra and Kumar 2011). Clear patterns emerged in our study showing an *inverse* relationship between SK and OK, and IPOs, which contradicts previous findings. We examined a non-trivial, information rich insurance task where there was no dominant option. While evidence suggests SK and OK tend to be correlated, they do not have to be. By using a novel way to manipulate SK – which could be adapted by salespeople in real-world contexts – we ensured that SK and OK were not always in accord. High (low) SK and high (low) OK exhibited similar effects on effort expended. Whether high or low, there were no discernable differences in final choices, suggesting that no group jumped to a simplifying choice heuristic. Instead, those low in knowledge compensated for this deficiency by taking more time framing the problem and reaching a thoughtful decision, a decision process that weakens the effect of branding.

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Table 1. Summary of hypothesized effects of SK and OK

	Low OK	**High OK**
Low SK	OK/SK are positively correlated • spend more time solving the problem; • engage in more problem framing related activity; • are more prone to misunderstanding provided information; • engage in more overall Information Processing Operations (IPOs).	OK/SK are **not** correlated • spend more time solving the problem; • engage in more problem framing related activity; • are less prone to misunderstanding provided information; • engage in more overall Information Processing Operations (IPOs).
High SK	OK/SK are **not** correlated • spend less time solving the problem; • engage in less problem framing related activity; • are more to misunderstanding provided information; • engage in less overall Information Processing Operations (IPOs).	OK/SK are positively correlated • spend less time solving the problem; • engage in less problem framing related activity; • are less prone to misunderstanding provided information; • engage in less overall Information Processing Operations (IPOs).

- Most studies have shown OK and SK to be positively correlated, although correlations differ widely (Carlson et al. 2009). Individuals can certainly over- or under-estimate their true knowledge levels (OK). Endeavoring to raise OK by providing additional information can have the perverse effect of lowering one's SK (Hadar et al. 2013).

Table 2. Mean count in each coding category by treatment condition

	High SK & High OK **HH**	Low SK & High OK **LH**	High SK & Low OK **HL**	Low SK & Low OK **LL**
Number of problem framing activities	26.44	45.31	38.44	62.88
Number of holistic processes	10.06	8.25	11.31	11.56
Number of attribute evaluations/comparisons	13.44	19.06	14.88	21.31
Number of misunderstandings	1.50	0.63	3.31	3.06
Other processing operations	3.13	3.44	3.88	5.00
Number of total information processing operations	54.56	76.69	71.81	103.81
Decision time (in minutes)	15.63	19.50	21.88	28.06

Table 3. Insurance policy choice by treatment condition

Decision		Condition				Total
		HH	LH	HL	LL	
A	Count	4	5	6	4	19
	Expected Count	4.8	4.8	4.8	4.8	19.0
B	Count	1	1	0	2	4
	Expected Count	1.0	1.0	1.0	1.0	4.0
C	Count	7	5	4	4	20
	Expected Count	5.0	5.0	5.0	5.0	20.0
D	Count	4	5	3	6	18
	Expected Count	4.5	4.5	4.5	4.5	18.0
E	Count	0	0	3	0	3
	Expected Count	.8	.8	.8	.8	3.0
Total	Count	16	16	16	16	64

Appendix A. Illustrative coding categories and examples quotes (translated from Finnish)

A. Framing statements

"I don't have any unusually valuable property"
“How is it with respect to deductible and premium?”

B. Holistic processing

Alternative evaluation: "By the way, A is really a bad option"
Feature evaluation: "All of the alternatives have index clauses"

C. Attribute evaluations/comparisons

"B has the highest premium of them"
"A has € 58 premium, deductible is only € 100, € 100 in liability insurance, it's € 300 in householder's insurance. C, replacement value is € 20,000 and indeed covers radio and TV set and other electric appliances, that is not covered in A. And then it covers money up to € 400, that's enough and indoor repairs up to € 3,000, it's enough for me"

D. Misunderstandings

"Insurance is € 100" (*incorrect value*)
"Here is a term ‘underinsurance’ that I don't understand"

E. Other processing operations (including choice related statements)

"Of course the insurance is more expensive if the deductible is lower"
"I think I would take E"

Appendix B. Information available to decision makers

Objective of Insurance: Homeowner's insurance, which covers your home and possessions like money (up to € 1,000), domestic belongings and tools for gainful employment. However, for unusually valuable possessions, itemization is recommended.

Scope of Validity: The insurance is valid at the site specified in the policy and temporarily all over the world. The liability and legal protection insurance are valid all over the world.

Scope of Coverage: The insurance covers damage caused by a sudden and unexpected occurrence. The insurance includes liability and legal protection insurance.

Items and Events Not Covered: The Insurance does not cover damage caused by normal wear and tear, rust, spoilage, or an equivalent gradual phenomenon and damage to property through loss or carelessness.

Sum Insured: The sum insured is determined on the basis of the square meters of the apartment.

Maximum Coverage: Underinsurance is not possible, and the indemnity is always paid in full. For the liability insurance, the maximum coverage is € 100,000, and the legal protection insurance is € 10,000.

Deductible: € 180. For the liability insurance, the deductible is € 180 and for the legal protection insurance, 15 % of the indemnifiable costs, yet not less than € 200.

Additional Indemnity: The insurance covers interruption of residence caused by damage at 5 % per month at the most (in this case € 250/month) for a period not exceeding 6 months.

Premium: € 64 per annum.

Index Clauses: The insurance is index-bound with regard to sum insured, deductible, and premium.