

Improving Financial Decision Making With Unconscious Thought: A Transcendent Model

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This article explains that a more rational and optimal approach to financial decision making than is proposed by finance theories alone would be that includes unconsciousness into the process. The total cognitive decision making capacity of an individual is comprised of both a conscious component and an unconscious component; and these two components are complementary and compensatory to each another. A decision-making process that integrates these two components would, therefore, first generally improve the quality of decisions, and second reduce the unfavorable impact of behavioral biases (with overconfidence, heuristics, etc as examples) on decision making.

Keywords: Conscious thought, Unconscious thought, Decision making, Behavioral biases

When making a decision of minor importance, I have always found it advantageous to consider all the pros and cons. In vital matters however . . . the decision should come from the unconscious, from somewhere within ourselves. — Sigmund Freud,¹

INTRODUCTION

Many novelists have a pocket book to jot down ideas when they are not writing at their desks. Woody Allen, U.S. actor and director, has a practice of developing films from ideas that are initially noted on napkins and other inappropriate pieces of paper that he could find at the time. Prof. Stephen Ross first thought of Arbitrage Pricing Theory when he was dining in a restaurant. These are examples of ideas originated from unconsciousness. Likewise, eureka experience is one when the cause of a problem, the solution for a deadlock or a discovery suddenly dawns. A scientist might be trying to solve a mystery, a composer might be developing the notes of a piece of music, and a software engineer might be working through the logic of a system. Ideas are there, but they are

nascent, vague, ill-formed, or simply stuck. At some point in time, however, when the actors are not consciously working on the challenges, the way to go forward comes to mind. Such bursts of inspiration from unconsciousness may originate at awkward moments, and one would desperately try to write the thoughts down before they are lost. Archimedes' principle is one of the better known of these examples.

Unconsciousness works in other aspects as well. One might have benefited from the advice “to sleep on it” when facing a problem or indecision, to allow unconsciousness to mull over the issue so as to achieve a better solution or decision. Charles Dickens had two endings for *Great Expectations*. He put the matter aside for quite a while before he finally made the choice. In subliminal advertising, efforts are directed explicitly at unconsciousness attempting to achieve the desired outcome. James Black, Nobel-winning developer of blockbuster medicines, has his own prescription for effective drug discovery: “Creativity is not a method that can be learnt and taught . . . Daydreaming allows the process to go into free fall. Suddenly, there is a new idea . . . We cannot organize this process . . .” (*Financial Times* [February 2, 2009]).

There is much evidence that unconsciousness is at work in various dimensions of our daily lives. Integrating previous research on consciousness and unconsciousness, Kahneman [2003] summarizes and labels two types of operations in judgments, decisions, choices, and behavior: operations of System 1 that tend to be automatic, effortless, associative,

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¹Quoted in Dijksterhuis, 2004

implicit, and often emotionally charged; and operations of System 2 that are slower, consciously and deliberately monitored, and potentially rule governed.

The objective of this article is to provide a better understanding of the compensatory and complementary properties of consciousness and unconsciousness from a multidisciplinary (philosophical, psychological, and neural) perspective, and explain and illustrate with specific examples how these properties can be applied to make better financial decisions.

The remainder of the article is organized as follows: The nature of consciousness and unconsciousness is first explained from a philosophical, psychological, and neural perspective. Against this background, the different cognitive properties of consciousness and unconsciousness that have been identified by psychological experiments and their impact on decision making are explained, with particular reference to how these properties of unconsciousness can improve the quality of decisions generally, and attenuate the unfavorable impact of overconfidence; availability, representativeness, and anchoring-and-adjustment heuristics; attraction effect and subjective experience on financial decision making specifically. The limitations of unconsciousness are then highlighted as it alone would not be the perfect solution for decision making. To mitigate these limitations, a conscious-unconsciousness thought integrated transcendent model is proposed where conscious thought and unconscious thought compensate and complement each other to provide a total, rational, and optimal cognitive decision-making capacity for individuals. A simple practical approach to implement the model is then suggested. Concluding remarks and suggestions for future research are presented in the last section.

NATURE OF CONSCIOUSNESS AND UNCONSCIOUSNESS: PHILOSOPHICAL, PSYCHOLOGICAL AND NEURAL

What Is Consciousness?

Consciousness is one of those concepts that many people use and assume others understand. Moreover, it is commonly assumed that there is only one kind of consciousness. However, consciousness could have different modes. According to the philosopher and psychologist William James, "...our normal waking consciousness is but one special type of consciousness ... [there are other] potential forms of consciousness that are entirely different. We may go through life without suspecting their existence, but apply the requisite stimulus and at a touch they are there in all their completeness ..." (quoted in Newman [2001]).

Newman [2001] is more specific and postulates that there are at least three kinds or orders of consciousness. The first order is called awareness. Awareness only informs us the hard objective facts, for example, we are thirsty or we feel

energetic or sick, but does not explain how and why we arrive a particular state of mind (e.g., being angry) or where it takes us. Nor does it recognize that our perceptions and understanding are conditioned by our prior experiences, perspectives, culture, and beliefs.

The second order of consciousness recognizes the experience of reality as a psychic event rather than an objective happening. This order of consciousness is the psychological cognition that recognizes the subjective in the objective—the psychological capacity of the observer to see through or into the meaning of what is being observed. It is this second order of consciousness that enables us to recognize our own personal subjectivity and appreciates that someone else could experience the same event differently.

The third order of consciousness takes us to the impersonal, meta-psychological plane that events occur on, showing how our minds involuntarily operate. It is probably the closest we can come to unconsciousness.

These three orders of consciousness have different functions. Awareness helps us to realize who and where we are physically and the nature of our surroundings, but it cannot effect change in us. Only the second and third orders of consciousness hold the possibility to effect change in our attitudes and behavior and, to a degree, as to who we are as a more complete person, not just the physiological aspects, for these two orders of consciousness are the precursors of psychic transformation.

There is no consensus as to how consciousness works in our brain. For example, two leading neuroscientists, Koch and Greenfield, have different views on the activity that takes place in the brain even on simple subjective experience like seeing a cat, hearing the music, or feeling depressed. In general and simplest terms and for each conscious experience, Koch's theory is that a unique set of neurons in particular brain regions fires in a specific manner. Specific groups of neurons mediate distinct conscious experiences. In contrast, Greenfield's theory is that neurons synchronize into coordinated assemblies that subsequently disband. Consciousness is generated by a quantitative increase in the holistic functioning of the brain (Koch and Greenfield [2007]).

If there is no consensus in how consciousness works, can we study conscious financial and investment decisions in our brains? There is some progress in the matter. Financial and investment decisions are often explained from the concept of expected utility (each outcome is associated with an expected degree of pleasure, satisfaction or net benefit, called utility), which in turn can be based on the concept of expected monetary values (product of probability and associated expected gains and losses). There are findings to suggest decision making processes that are based on the utility concept may indeed be instantiated in our brains. Based on various reward magnitude and probability, Knutson et al. [2005] found that activation in striatal reward areas of one's brain indeed correlates with expected utility. With no disrespect to human, Padoa-Schioppa and Assad [2006] found that neurons in the

monkey's orbitofrontal cortex encode the subjective value of various decision alternatives (juice vs. water in the experiment), independent of any action required to select between them, thus providing evidence for a neural decision-making mechanism that is not tied to motor responses but to some phenomenon not alien to the utility concept.

Without consensus in the neural-scientific explanation of consciousness, can we go beyond consciousness and study how unconsciousness affects financial and investment decisions? We can start exploring the answer to this question with the philosophical explanation of what unconsciousness is.

What Is Unconsciousness?

According to Jung [1960], the unconscious mind is composed of two components: personal subconsciousness (initially referred to as personal unconsciousness) and collective unconsciousness. A name, word, or thought that is forgotten but is "on the tip of the tongue" has momentarily disappeared from consciousness and enters the personal subconsciousness. The subconsciousness, in Jung's words [1960, para. 382], is formed by "everything of which I know, but which I am not at the moment thinking; everything of which I was once conscious but have now forgotten; everything perceived by my senses, but not noted by my conscious mind; everything which, involuntarily and without paying attention to it, I feel, think, remember, want, and do". The unconsciousness is not only formed of subconscious contents that have dissociated from consciousness. There are also ideas, attitudes, and ways that have never before been conscious. These are "all the future things that are taking shape in me and will sometime come to consciousness" (Jung [1960]). The totality of the unconsciousness, therefore, in Jung's concept, comprises the subconscious content and those psychic contents that have not emerged from the collective unconsciousness. From the subconsciousness come complementary corrections, and from the realm of the collective unconsciousness come new ideas, images, paths, and unknown solutions. The whole of the unconsciousness, in both its complementary and compensatory capabilities to consciousness, operates outside of conscious control. The unconsciousness spins, transforms, and evolves, but it can never learn because it is never anything but unconscious . . . about everything, including itself (Newman [2001]).

At this point in time, it appears that there are no findings from neuroscience on the links between financial decisions (or any decisions) and unconsciousness, which is not surprising in view of the lack of consensus even on the working of consciousness. However, psychology does shed some light on the matter.

Conscious and Unconscious Thoughts

The explanation of the impact of consciousness and unconsciousness on decision making can start with the definition of

conscious thought and unconscious thought by psychologists Dijksterhuis and Nordgren [2006].

Conscious thought is the object-relevant or task-relevant cognitive thought processes that occur while the object or task is the focus of one's conscious attention, or what a layman would simply refer to as thought. For example, I am consciously deciding whether I should buy Microsoft or Dell stock. Conscious thought is thought with attention. Unconscious thought is thought without attention, or with attention directed elsewhere. Technically, unconscious thought refers to the object-relevant or task-relevant cognitive or affective thought processes that occur while conscious attention is directed elsewhere. I discontinue with the conscious thinking of stock investment and read a novel instead. While I am reading the novel, the thought "buy Dell" enters into my consciousness. The thought "buy Dell" itself is conscious, but the transition from the indecision to the conclusion for Dell is the result of unconscious thought.

From the perspective of psychology, conscious thought and unconscious thought have different properties and different degrees of the same properties, and hence have different impacts on decision making.

Capacity

With the experience of information overload, one can easily appreciate that consciousness has limited capacity, and the capacity would probably vary among individuals. As unconsciousness comprises personal subconsciousness and collective unconsciousness, one can speculate that the capacity of unconsciousness would probably be larger than that of consciousness, even though its extent is yet to be explored. There is indirect evidence to support this view. Betsch et al. [2001] have shown that unconsciousness can integrate large amount of information. With simple objects such as jams and apartments, respectively, Wilson and Schooler [1991] and Dijksterhuis and Nordgren [2006] have demonstrated that, because of its limited capacity, conscious thought can focus on a limited number of attributes only and at the expense of other relevant attributes, and ultimately at the expense of the quality of a choice or decision. Unconscious thought does not display such deficiencies.

The extent of capacity also affects decision making in a different way. The limits on working memory (which is closely related to the capacity of conscious thought), either intrinsic or extrinsic, are predictive of a more impulsive decision making style, that is, decision making that favors short-term over long-term consequences of actions (Hinson et al. [2001]).

In another experiment on limited capacity, Shiv and Fedorikhin [1999] demonstrated that, by reducing the availability of processing resources and increasing memory load, a greater reliance on the cognitive bias of affect was detected. The impact of affect in investment decisions has partly contributed to the past Initial Public Offering (IPO) bubbles,

which can be explained as follows. Many investment analysts and investors base their judgments of risk and return on widely held contemporary attitudes. If stocks were perceived to have good outlook, they were thought to promise higher returns and lower risks. If their outlooks were perceived to be poor, they were expected to provide lower returns and higher risks (Editorial Commentary, JBE [2004]).

Apart from the impact on style and cognitive bias, the capacity constraint of conscious thought has other impacts on decision making and judgment as well.

Judgment and Quality of Decision

Social cognition research (e.g., Macrae et al. [1993]) on stereotyping shows that people's use of stereotypes or schemas increases generally under the circumstances of constrained processing capacity. Dijksterhuis and Nordgren [2006] found that, by comparison, unconscious thinkers, presumably because of the greater capacity of unconsciousness, demonstrate less stereotyping, make more neutral judgment, and recall and use more stereotype-incongruent information.

These findings are consistent with the work on predecisional distortion (Carlo and Russo [2001]). When people consciously form a judgment based on considerable amounts of information, they often quickly form a prejudgment that works as an expectancy, biasing the interpretation of the information subsequently processed, even when people are warned not to make such a prejudgment. People would quickly create their own expectancy to guide further conscious thought if an explicit expectancy is not available. In another words, when one thinks consciously under capacity constraint, one might merely process information to confirm an expectancy rather than genuinely make an unbiased judgment.

However, if the constraint of capacity is lessened, better decision and judgment can be achieved through better organization of information processed, in addition to the additional capacity that processes information.

Based on the choice of a desirable roommate from three hypothetical candidates (each has 12 different characteristics) by participants of the experiments, Dijksterhuis and Nordgren [2006] conclude that unconscious thinkers made better decisions than conscious thinkers or immediate choosers (those who do not think at all). There are two explanations why unconscious thinkers make better decisions, the first being people's representations are more distinctly polarized under unconscious thought (in the case of the experiment, the positive characteristics of the desirable roommate and the negative characteristics of the undesirable roommate were much more accessible than the negative characteristics of the desirable roommate and the positive characteristics of the undesirable roommate). The second reason is that the unconscious thinkers show a certain degree of clustering, suggesting that they have better organization of information

in memory. More polarized and better organization of mental representation leads to better decisions and judgment.

Weighing Attributes

According to Prospect Theory, investors place different weights or utility on the same magnitude of gains and losses; that is, investors are more distressed by prospective losses than they are made happy by equivalent gains. Consequently, when facing sure gain, most investors are risk averse in decision making but are more willing to take on risk when they face potential loss of the same magnitude. This reflects investors' inconsistency in assigning weights to the same attributes, and psychological research suggests it is conscious thought that disturbs the natural process.

Based on the findings of the same experiments in choosing the desirable roommates as discussed earlier, Dijksterhuis and Nordgren [2006] propose that unconscious thought naturally weights the relative importance of various attributes, while conscious thought disturbs this natural process (e.g., by biases) and often leads to suboptimal weighting. Schooler et al. [1993] have similar findings: conscious thinkers put disproportionately more weight on attributes that are readily accessible, plausible, and easy to verbalize, and too little weight on other attributes. This is what La Porta et al. [1997] had found among the financial analysts—they consistently assign disproportionately high weight to firms' recent performance, consequently and consistently overestimate the value of firms with good recent performance, and underestimate firms with poor recent performance.

Along a slightly different dimension, Wilson et al. [1993] found that introspection could change an optimal weighting scheme into a suboptimal one, as people might focus on those attributes that seem like plausible causes of the evaluation. Levine et al. [1996] and Dijksterhuis and Nordgren [2006] further demonstrate that conscious thinkers are more inconsistent in their weighting of attributes than unconscious thinkers do.

Creativity

Wallas [1926] explains that the creative process has four stages: preparation, incubation, illumination, and verification. That a complete but temporary discontinuation (a break) from the attentive activity devoted to a problem may facilitate the solution process is the phenomenon of incubation. The concept of incubation closely resembles Dijksterhuis and Nordgren's [2006] definition of unconscious thought: thought with attention directed elsewhere. From this perspective, unconscious thought is more capable of generating creative and unusual ideas than conscious thought; particularly when one thinks consciously, one tends to merely confirm expectancy or to stereotype, as explained earlier.

However, unconscious thought and incubation work differently. Dijksterhuis and Nordgren [2006] postulate that the

crucial solution or the creative idea must be constructed in the mind at some point in time by a thinking process and not by the mere act of distraction, and it is more probable that the crucial solution or creative idea is constructed by unconscious thought and not by conscious thought. However, unconscious thought chooses its own time and place to deliver its products into consciousness thought. One might have heard of the three Bs: bath, bed, and bus. Quite a number of discoveries have been found in these unexpected places.

In contrast, Segal [2004] explains the incubation phenomenon with the *returning-act hypothesis*. According to the hypothesis, no other activities take place during the break from the attentive activity that the actor is trying to solve the problem. The break's only function is to divert the solver's attention from the problem, thus releasing the mind from the grip of a false organizing assumption. This enables the solver to apply a new organizing assumption to the problem's components upon returning to the problem. A less demanding activity during the break serves as a weaker diversion from the influence of the false assumption. The results of Segal's [2004] experiment indicate that the break itself improves performance in insight problems, but the duration of the break does not. If a creative idea or solution takes time to develop, then Segal's findings are inconsistent with Dijksterhuis and Nordgren's [2006] hypothesis. James Black's concept of creativity (*Financial Times* [February 2, 2009]) is more in line with Dijksterhuis and Nordgren's [2006] hypothesis, though.

Complexity

From the discussion of the properties of conscious and unconscious thoughts so far, one can appreciate that the latter would be more capable to manage complexity and perform better under demanding circumstances. Findings from Dijksterhuis and Nordgren [2006] support this opinion. Participants in the experiment were instructed to choose the best of the four hypothetical cars, progressing from a simple condition of four features to a difficult condition of 12 features. Conscious thinkers performed well under simple conditions but poorly under difficult conditions. Unconscious thinkers perform well in both conditions; their performance does not vary with conditions.

In summary, with its complementary and compensatory properties to conscious thought, unconscious thought can generally improve the quality of decisions made consciously. These properties of unconscious thought can also attenuate the behavioral biases in financial decision making that have been noted by researchers.

UNCONSCIOUS THOUGHT ATTENUATING BEHAVIORAL BIASES

The unfavorable impact of overconfidence, heuristics, and behavioral biases on financial decision making have been

identified in past research, but apparently no solutions have been suggested to overcome these unfavorable impacts. In subsequent sections, we explain while overconfidence, specific heuristics, and behavioral biases could lead to suboptimal financial decisions, the properties of unconscious thought discussed in this article could improve the quality of financial decision making even in the presence of overconfidence, heuristics, and behavioral biases.

Overconfidence

Confidence in one's abilities is always helpful in one's achievements in life, but overconfidence in finance and investment may result in suboptimal decision making and inferior investment performance. Odean [1998] has argued that overconfident investors display excessive high rate of trading in stock markets. Many of these investors engage in active trading because they are overconfident in their ability to pick winners and consequently are most willing to incur even excessive buying and selling costs to construct their perceived "winning" portfolios. However, higher level of trading does not necessarily lead to better performance. Barber and Odean [2000] show that the more active traders have inferior performance compared to the less active traders because of the trading costs. Malmendier and Tate [2005] also use overconfidence to explain the high rates of corporate mergers and acquisitions, despite many such ventures fail.

Overconfidence is related to confirmation heuristic, according to Bazerman and Moore [2009, p. 37]). Since human mind is better at searching memory for confirming than disconfirming evidence, it will be easier for people to generate supportive than contradictory evidence. Just as anchors facilitate recollection of anchor-consistent information, our initial guesses about uncertain quantities facilitate selective mental accessibility of information that is consistent with these guesses. Adjustment from these "self-generated anchors" is often insufficient (Epley and Gilovich [2001]), producing an excessive confidence that the initial estimates are infallible (Block and Harper [1991]). Bolstering by the availability of supportive evidence, we overestimate the accuracy of our knowledge and the truth of our tentative hypothesis (Koriat et al. [1980]). In this way, confirmation heuristic leads to overconfidence (Soll and Klayman [2004]).

One way to minimize overconfidence is to mitigate the impact of confirmation heuristic, that is, putting the final decision aside for a while to allow unconsciousness the opportunity to select information more objectively for evaluation and to assign more appropriate weights to the relevant attributes for decision making. As discussed in the previous sections, unconscious thought is superior to conscious thought in these aspects.

Heuristics

Heuristics are "mental" shortcuts people use commonly to help make decisions or form judgments, particularly when

facing incomplete information or complex problems. In finance and investment, different heuristics are useful in different types of forecasting. The heuristics that an individual employs depends largely on whether forecasts are made from information held in memory, from information about the level of a variable other than the one being forecast, or from information about earlier levels of the variable being forecast. Hogarth and Makridakis [1981] suggest that these judgmental forecasts (i.e., forecasting with unaided judgment) are based on the sort of heuristics that Tversky and Kahneman [1974] discussed: availability, representativeness, and anchoring-and-adjustment.

People use availability heuristic when they “assess the frequency of a class or the probability of an event by the ease with which instances or occurrence can be brought to mind” (Tversky and Kahneman [1974, p. 1127]). Schwarz [2004] has a similar opinion: judgment can be based on both the content of accessible judgment-relevant information and the subjective ease with which this information comes to mind. For example, one is asked which company’s stock will do better: A or B. A is a company that attracts a great deal of publicity; B is a low profile company. One would tend to pick company A. Frequent reporting of an entity in the media increases its availability in memory and thus increases its likelihood of coming to mind and being selected. “Sleep on it” would mitigate the influence of ease of retrieval on decisions and judgment because of the delayed time factor, which allows unconscious thought the opportunity to bring other less accessible information into consciousness.

People use the representativeness heuristic when they judge probabilities “by the degree to which A is representative of B, that is, by the degree to which A resembles B” (Tversky and Kahneman [1974, p. 1124]). Suppose one is asked which company’s stock would have a higher probability of achieving 12% in its return: A or B. A is a technology company; B is a finance company. C is a commercial bank and the return of its stock is given as 11%. One would tend to pick B because B resembles C more than A. One limitation of using representativeness heuristic is the failure of taking uncertainty into consideration. As in the case of attenuating availability heuristics, unconscious thought may bring other less accessible information and factors to be considered into consciousness.

People use anchoring-and-adjustment heuristic when they “make estimates by starting from an initial value that is adjusted to yield the final answer. The initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of partial computation. In either case, adjustments are typically insufficient” (Tversky and Kahneman [1974, p. 1129]). For example, one is initially asked if the return on Microsoft’s stocks is greater or less than a randomly selected number, say 50%. Subsequently, one is asked to estimate the return of Microsoft stock. One would tend to have an estimate close to 50% on either side, displaying an anchoring effect on the 50% and an underadjustment.

Many studies suggest that people use the last data point in the series as a mental anchor and then adjust away from that anchor to take account of the major features of the series. As adjustment is typically insufficient, their forecasts are biased (Harvey [2007]). This anchoring-and-adjustment bias has been noted in financial markets (e.g., La Porta et al. [1997] previously explained in the section of Weighing Attributes), which unconscious thought can correct by assigning an appropriate weight to the anchor.

Attraction Effect and “Fuzzy” Decisions

Attraction effect refers to the phenomenon that an additional item into the choice set changes a decision-maker’s perception of the relationship between the previously available alternatives, and the new perception of the relationship is contrary to rational decision making. A variety of theories have been put forward to explain the phenomenon (Roe et al. [2001], Wedell [1991], Simonson [1989]). In simple terms, attraction effect occurs because a decision maker changes the weight, or valence, of a candidate in the presence of additional eligible or competing candidates. From another perspective, a decision maker changes the weights of the attributes used to evaluate the competing candidates in the presence of additional eligible or competing candidates. In either case, the change in weight is suboptimal.

Capital allocation decisions in portfolio construction fits very well into the context of attraction effect: allocating funds between asset classes such as financial assets versus commodities; between asset types such as bonds versus stocks; between industries such as airlines versus electronics; and between entities such as Dell versus IBM or Mutual Fund A versus Mutual Fund B. The attraction effect can be illustrated with a classical example of allocating funds between Security S_A the target and Security S_B the competitor. The allocation is based on two attributes: expected annual capital appreciation E_C , and expected annual income E_I . S_A has a higher E_I and S_B has a lower E_I . S_A has a lower E_C and S_B has a higher E_C . There is a third security S_C , the decoy. S_A dominates S_C because S_A has a higher E_I and E_C than S_C . S_C has a higher E_I but a lower E_C , compared to S_B . The relationships between S_A , S_B , and S_C are depicted in Figure 1.

The mere presence of S_C , if not available for investment, should not affect the fund allocation decision between S_A and S_B . However, because the investor is aware of S_C , which is clearly inferior to S_A but not to S_B , the investor is more attracted to S_A (the asymmetrically dominating target) than to S_B and consequently allocates more funds to S_A relative to S_B . Schwarzkopf [2003] labels this phenomenon as *standard attraction*, where the decoy is not available for investment—funds allocation is between the target and the competitor only. If the decoy is also available for investment together with the target and the competitor, the phenomenon is labeled as *cluster attraction*. In this case, the investor notes that both S_A and S_C are better than S_B in E_I and may be attracted to

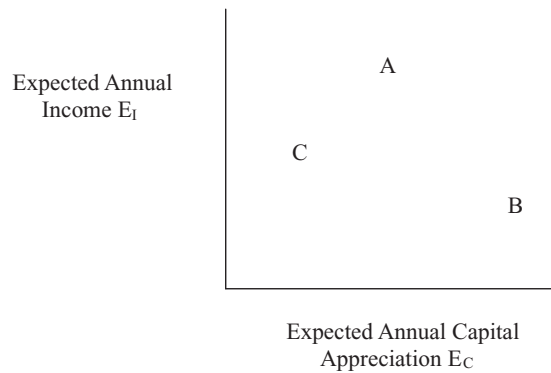


FIGURE 1 Allocation decisions and attraction effect (adapted from Schwarzkopf, 2003).

both, consequently allocates more funds to the S_A - S_C cluster, not just S_A , even though S_C is clearly an inferior alternative to S_A . Allocating funds to an inferior alternative is contrary to rational decision-making principles. If more funds are allocated to the target-decoy cluster, there is less funds for the competitor.

Hence, attraction effect influences allocation decisions when an investor allocates funds between two or more candidates, be the candidates securities, asset classes, or fund managers. Standard attraction is relevant to a local context (target vs. decoy in a choice set of two); cluster attraction is relevant to a global context (where many or all available alternatives are considered). Inevitably, investors would make allocation decisions in both the local context and the global context. Investors are particularly vulnerable to attraction effect in capital allocation decisions, the reason being in many instances, there are no precise rules or quantitative logic to guide such decisions in the presence of competing criteria as illustrated in the example. Consequently, the decisions are largely in a qualitative and “fuzzy” format—the outcome is “least likely,” “more probable,” and alike. Based on the properties discussed—capacity, judgment and quality of decision, weighing attributes, creativity, and complexity—we postulate that, relative to conscious thought, unconscious thought is more capable to make better decisions and form more sound judgment in a “fuzzy” context.

Subjective Experience

Many investors as well as finance and fund managers rely on subjective experience when making decisions. Reliance on subjective experience may lead to suboptimal decisions because these decision makers are more vulnerable to behavioral biases.

According to Danziger et al. [2006], the judgments of people who are predisposed to focus on subjective experience (i.e., the high-experiential processors) display ease of retrieval effect. For the low-experiential processors (who are less predisposed to rely on subjective experience), the ease

of retrieval effect occur only when ease of retrieval is called to their attention.

Summarizing previous research, Danziger et al. [2006] noted the following: high-experiential processors tend to be sensitive to their intuitions and subjective feelings and use them in information processing. Their cognitive systems are assumed to operate automatically, associatively, and relatively quickly. They are affected by past emotional experience and are mainly nonverbal. Specifically, high-experiential processors are more susceptible to heuristics and biases and to preference for small, short-term outcomes over large, long-term outcomes.

As noted earlier, the properties of unconscious thought on capacity, quality of decision and weighing attributes have the potential of reducing the vulnerability of high-experiential processors to the behavioral biases indicated by the researchers.

INTERMITTENT SUMMARY

Previous discussions have explained how unconscious thought would improve decision making and judgment in various aspects. Relative to conscious thought, unconscious thought can process more information with its greater capacity, is less vulnerable to impulsive decision making and relies less on cognitive bias of affect. Unconscious thought is more capable to produce polarized and organized mental representation and makes better decisions and judgment. Unconscious thought is more creative, performs well under both simple and complex conditions, and assigns appropriate weights to the relevant attributes for decision making and judgment. With these properties, unconscious thought could attenuate behavioral biases, as illustrated in the case of overconfidence; availability, representativeness, and anchoring-and-adjustment heuristics; attraction effect and subjective experience.

However, unconsciousness thought is not always superior to conscious thought in decision making and judgment. In the first instance, unconscious thought might manifest itself as mere “gut feeling.” In other instances, there are at least three reasons one should not trust unconscious thought completely, as explained in the next section.

LIMITATIONS OF UNCONSCIOUS THOUGHT

First, the skills set. Unconscious thought cannot perform even simple rule-based activities such as arithmetic or decisions that involve logic. According to Claxton [1997], during conscious thought one can deal with tasks that require precision such as solving mathematical problems and strict observation of rules such as “sell the stock if its annual return is less than 12%.” During unconscious thought, one cannot, for example, decide which stock to sell if the two stocks have returns of 11.5% and 12.5%, respectively, given the

rule of “sell when annual return is less than 12%.” In other words, unconscious thought alone cannot make financial and investment decisions based on expected probabilities and expected monetary values. However, decisions that are based on relative levels (high, medium, or low) of utility are within unconscious thought’s capacity. Dijksterhuis and Nordgren [2006] claim that unconscious thought can manage negotiations like “Stock A is not a good performing stock” quite well.

Second, the likelihood that all relevant unconscious input would be used for unconscious decision making, or technically, the likelihood that all relevant unconscious cognition about an object would be used as input to unconscious decisions concerning that object. The likelihood can be analyzed by Feldman and Lynch’s [1988] accessibility-diagnostics framework. According to the framework, the likelihood that any cognition will be used as input is a function of (1) the accessibility of the input in memory, (2) the accessibility of alternative inputs, and (3) the diagnostics of the input and of alternative inputs. Kahneman [2003] conceptualized accessibility broadly as determined by stimulus salience, selective attention, specific training, associative activation, and priming. An input is diagnostic to the extent that decision makers believe that the decision implied by that input alone would accomplish their decision goals (Feldman and Lynch [1988]). The observed characteristics of the alternatives are generally perceived as diagnostic if they are the bases for decisions. For conscious thought, the characteristics of the alternatives that the decision maker is aware of tend to be more accessible and received more attention than the unconscious inputs. As unconscious inputs are unconscious and the decision maker is not aware of them, they can be less relevant and convincing in terms of accessibility and perceived diagnosticity (Simonson [2005]).

Third, the validity of the findings from the psychological experiments on unconscious thought for real life applications. The properties of unconscious thought noted by researchers are based on laboratory, controlled experiments, assuming that the influence considered operates in an isolated form. Perhaps more significantly, the experiments are still conducted within the traditional consumer research framework that consumer choices are largely determined by the processing of task-relevant inputs, which might not be entirely appropriate for the unconscious mode of decision making. Decisions in real life would have multiple unconscious influences potentially; the priming effects of the unconscious influence considered could be less in an interactive mode and could diminish fast. At the same time, the explanatory power of the findings from the unconscious thought experiments might be particularly applicable only when comparing the findings to those from typical consumer choices experiments, where conscious information processing is supported by natural focal stimuli (i.e., the choice options), and by norms regarding the manner in which choices should be made. The explanatory power may

be less applicable to more complicated decisions such as security selection and to judgmental tasks such as the relevance of an asset allocation strategy to specified investment objectives.

Accordingly, we propose that the total cognitive capacity of a person in decision making is made up of both conscious and unconscious thoughts, and they complement and compensate each other. This total, conscious-unconscious thought integrated decision-making capacity is conceptualized by the following transcendent model.

Transcendent Model for Decision Making

A transcendent model to generally improve the quality of decisions and to attenuate the unfavorable effects of behavioral biases on decisions is proposed as follows:

$$d = x_1c * x_2u$$

The total cognitive decision-making capacity of an individual, d , is made up of two components: c , the conscious component, and u , the unconscious component; x_1 and x_2 are the corresponding coefficients; c , u , x_1 and x_2 are individualistic and dynamic – they are different for all individuals, different under different circumstances, and they change over time; $*$ is the two-way, compensatory and complementary interaction between the conscious and unconscious components; and x_1c is under the conscious control of an individual, while x_2u is not.

The model can be illustrated with the construction of a portfolio by Fund Manager A. x_1c is under the conscious control of Fund Manager A in the sense that A can consciously include specific asset classes and securities in the choice set, attributes adopted to consider the alternatives, information required for the attributes, techniques employed to construct the portfolio, and the competence he would like to acquire for the task with active learning. A can decide on the timing (when) and the duration (for how long) within which the portfolio is constructed. A can also consciously decide whether to allow the unconscious component x_2u to work on the construction of the portfolio by “sleeping on it,” taking a break, or being distracted from the conscious thinking of constructing the portfolio. This is the extent of A’s conscious control on x_2u – x_2u ’s contribution and the timing of their coming about are not under A’s conscious control.

The two-way, compensatory and complementary interaction between the conscious and unconscious components in the proposed transcendent model of decision making, $*$, can be explained as follows.

Compensating and complementing unconscious thought, conscious thought is responsible for all the input for the decision making, and these conscious input are also the source of all the unconscious input. However, the selection of the available conscious input as unconscious input for decision making is at the discretion of unconsciousness. Conscious thought is responsible for all the tasks that require precision,

logic, and rule-compliance—the quantitative tasks that unconscious thought cannot assume.

Compensating and complementing conscious thought, unconscious thought has greater capacity, and hence is less likely to be affected by information overload. It is less inclined to conform to expectancy and stereotypes and therefore is more objective. Unconscious thought is more effective in producing polarized and organized mental representation, which would enhance the quality of decisions and judgment. It is more consistent in assigning appropriate weights to the attributes considered and is less influenced by biases. Resembling incubation, which is a source of creativity, unconscious thought is more likely to solve complex decisions in new dimensions and to provide innovative solutions.

The complete decision-making process proposed by the transcendent model has three sequential stages: decision making by conscious thought, decision making by unconscious thought, and decision making again by conscious thought as the final stage. Unconsciousness output, if any, will be part of the conscious input in the third stage of the decision making. Unconscious thought compensates and complements conscious thought in the second stage; conscious thought compensates and complements unconscious thought in the final stage.

A practical approach that is based on the proposed transcendent model of decision making is as follows. We consciously set out to make the best decision first. When we think we have made the final decision, put it aside and not think about it for a while. If time is critical, briefly work on other entirely unrelated matters as distractions; the more challenging the distracting tasks, the better. In sum, consciously give unconscious thought an opportunity to work on decision. Not thinking about a problem or decision for a while may lead to forgetting wrong heuristics or inappropriate strategies, coming up with new insights, and may attenuate the biasing influence of primacy or recency effects. There is nothing to lose, and one never knows what unconscious thought might bring, as George Spencer Brown has said about Isaac Newton:

“... to arrive at the simplest truth, as Newton knew and practiced, requires years of contemplation. Not activity. Not reasoning. Not calculating. Not busy behavior of any kind. Not reading. Not talking. Not making an effort. Not thinking. Simply bearing in mind what is that one needs to know.”
(quoted in Claxton [1997, p. 58])

CONCLUSIONS AND SUGGESTED FUTURE DIRECTIONS

Finance theories provide the technical basis for rational and optimal financial and investment decision making. In this article, it is proposed that a more rational and optimal approach to decision making than what is proposed by finance

theories is to include unconsciousness into the process. The proposition is conceptualized in a transcendent model, from which a practical approach in decision making is suggested. The model is developed from the concept that the total cognitive decision-making capacity of an individual comprises a conscious component and an unconscious component. The properties of these two components, as noted by philosophers and psychologists, are complementary and compensatory to one another. A decision-making process that integrates these two components would therefore generally improve the quality of decisions and attenuate the unfavorable impact of behavioral biases on decision making. The latter is further explained with overconfidence; availability, representativeness, and anchoring-and-adjustment heuristics; and attraction effect and subjective experience as specific examples.

The benefits of unconscious thought in decision making, judgment, discoveries, and inventions should not be alien to many, as they would have the experience of benefiting from bursts of inspiration in various forms and at different times of their lives, as history and personal experience have witnessed. Such moments of inspiration are manifestations of unconsciousness at work.

The pursuit of understanding the impact of unconsciousness on financial and investment decisions could open a new frontier for behavioral finance. There is already a new interdisciplinary science, neuroeconomics, striving to better understand financial decision-making behavior by taking into consideration the cognitive and neural aspects, and simultaneously, bringing in the quantitative decisional aspects from finance and economics. At this point, it is doubtful that controlled experiments can be conducted to study the direct impact of unconsciousness on financial or investment decisions; one of the challenges is the task of finding sufficient number of participants who have equivalent competence in finance or investment, even if another challenging task of measuring accurately (not simply by academic qualifications, professional experience or tests) the cognitive competence of people in these disciplines can be achieved. Hence, a few small steps forward are suggested as directions in future research in the subject matter.

Both philosophers and psychologists could provide further insights into the nature of unconsciousness and on the interaction between consciousness and unconsciousness in decision making and judgment. In addition to the traditional consumer research framework where consumer choices are largely determined by processing of task-relevant inputs, psychologists could develop a more appropriate research framework for unconscious mode of decision making. Finance theories explain how rational financial and investment decisions could be based on expected monetary values and expected utility. Research in neuroscience can empirically examine the extent that people adopting these concepts in their financial and investment decision making. Heuristics is common in decision making. Better understanding of the formulation of heuristics, that is, how consciousness,

unconsciousness, or their interactions assign and sum probabilities and utilities of events over time, would further enrich the utility-based decision models, and how decision makers choose among alternatives with heuristics. This could be of particular relevance to strategic decisions such as capital and asset allocations in investments and capital budgeting in firms, where uncertainty is high and consequences are difficult to quantify. Experiments could be conducted to support or refute whether unconsciousness can attenuate the impact of specific heuristics and behavioral biases on decision making. Prospect theory indicates that people based their decisions on a flexible reference point—relative gains and losses rather than absolute levels. It means that, in reality, individual decisions are more subjective and less objective, rational and optimal than what economic and finance models assume. The concept of flexible reference point or subjectivity could be incorporated as another dimension for the quantitative utility models. Finally, a challenge for the psychologists: is it possible for individuals to have some conscious control on unconsciousness, or at least, one can consciously induce or facilitate unconsciousness to participate in the decision process?

There are many challenges to overcome in the suggested research. Various disciplines have different theoretical assumptions and research methods, and a multidisciplinary approach could lead to additional constraints. However, given the findings emerging, it is likely that such an interdisciplinary approach would contribute more to the understanding of financial and investment decision making, over and beyond what researchers can advance within their own disciplines independently.

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