

Beyond Behavioral Finance

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Throughout its history, finance theory has made certain simplifying assumptions regarding human behavior and concerned itself with whether the implications of these assumptions were true and not with whether the assumptions themselves were. Recently, however, more interest has been shown in experimental investigation of these assumptions, and the resultant behavioral finance has been presented as a significant departure from the current research paradigm. Recent research in cognitive science, however, is finding that the mind can and does work differently than traditional finance assumes, and the differences between the behavioral assumptions of traditional finance and the supposedly more realistic ones of today's behavioral finance are frequently superficial. Knowledge and knowing are likely to be profoundly different from the forms in which we have incorporated them in our extant models, both traditional and behavioral, and they differ in ways similar to those which, for example, have differentiated corporations from corporate images in marketing. To truly understand what is going on we must go beyond behavioral finance to address these differences.

Throughout its history, finance theory has made certain simplifying assumptions regarding human behavior, and, in the spirit of Friedman (1953), concerned itself with whether their implications were true and not with whether the assumptions themselves were true. Recently, however, more interest has been shown in experimental investigation of these assumptions. This *behavioral finance* has been presented as a significant departure from the previous research paradigm (Fama, 1998), and in some ways it is. If, for example, experiments show that investors cannot consistently rank investments based upon expected return and risk, then the value as positive theories of some of the cornerstones of finance such as the Capital Asset Pricing Model and the Black-Scholes Option Pricing Formula must be questioned.

But in some ways, behavioral finance isn't much of a departure. Behavioral finance still considers expected return and risk to be quantifiable variables and investment to be a task of estimating them and ranking investments based upon the estimates. Although the decision calculus of investors being uncovered by behavioral finance is turning out to be quite different than the rational decision calculus assumed in traditional finance (Thaler, 1991), the fundamental concepts (*expected return*, *risk*, *investment*) that enter into it remain the same. The

subject of this paper is how these and other such fundamental concepts of finance might differ from the traditional concepts of them, and what the implications of those differences might be for finance research.

Let us begin with the question what it means for us to *know* something. Consider the *corporation*, in which investors invest. Under law in the United States, the corporation is a person, and this raises an interesting question: Can we know a corporation in the same way in which we know a person? Because we use the same verb *to know* in English for both activities and the same noun *knowledge* for both results, we may pay insufficient attention to the differences between the two. This is not true in some other languages, in which it is more explicit that we are speaking about two different things. In Slovene, for example, to know some *thing* is *vedeti* and such knowledge is *vednost*, while to know some *one* is *poznati* and such knowledge is *poznavanje*. To know (*poznati*) a person is not the same thing as to know (*vedeti*) something about the person.¹

Using these Slovene words, we might say that financial statements provide us with knowledge (*vednost*) about a corporation. But is there another knowledge (*poznavanje*) of a corporation of which this knowledge (*vednost*) is only a part? Can we know a corporation in the same way in which we know a person? Is our subsequent behavior concerning the corporation—deciding whether or not to become an investor or customer for example, or even estimating its expected return and risk—influenced by the form of knowledge (*vednost* or *poznavanje*) we have?

In the literature of business disciplines other than finance, most often marketing, we find the term *corpo-*

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rate image. As commonly used, the term strongly implies that we can indeed know about a corporation in the traditional sense (*vedeti*) and also know it as if it were a person (*poznati*). The literature of marketing asserts that (at least in our role as consumers and perhaps also in our role as investors) corporate images are important in our decision-making processes.

In finance, if there really are different forms of knowledge for fundamental concepts such as *corporation* (and of course *expected return*, *risk*, *investment*, and others as well) that fact will affect our behavior in making investments and other decisions. This is the sort of question one might expect a discipline called *behavioral finance* to address. So far, however, *behavioral finance* is a term applied to work that refers to the psychology literature as support for what might be called *quasi-rational* assumptions, to use Thaler's (1991) phrase. It describes the ways in which people use cognitive shortcuts, and the ways in which that process sometimes yields results that aren't strictly rational. For the most part, however, behavioral finance uses the same methods and the same methodology as traditional finance. One might argue that these new assumptions are more *realistic* than those of the self-proclaimed *rational* finance school, and reflect a concern with realism at odds with Friedman's instrumentalism. But can the assumptions really be made realistic enough, or is a more sweeping reappraisal of methods and methodologies called for?

We begin in the next section with an introduction to *images* as a general concept, primarily in the cognitive science literature, and ask whether there are in fact different forms of knowledge (such as those which we are calling *vednost* and *poznavanje*). Then, in the Corporate Images section, we focus on the use of the term *corporate images* in the business literature, primarily marketing, and ask whether we can know a corporation in similarly different ways. In Images and Reality we turn to a critical but quite thorny methodological issue and ask if the *image* of something such as a corporation is its *reality*. We conclude in the final section with the discussion of how the findings might be applied to take research beyond today's notion of behavioral finance.

Images

The phrase "corporate image" is an interesting one because *image* is a commonplace term used in a number of academic disciplines. It is especially common in psychology—more specifically in cognitive science.² There we find a vigorous debate over whether or not there are alternative forms in which the mind can store and process information, one of which is *images*.

Although the marketing literature concerning *corporate images* often refers to this cognitive science lit-

erature concerning *images*, it is not at all clear whether they are really talking about the same thing. Moreover, some work in cognitive science³ is highly relevant, even though it may not explicitly use the term *images*. Nevertheless, to circumscribe our task within manageable limits, we have chosen to focus our attention on *images*, because the term *image* has historically been used in the business literature in connection with similar concerns. Much of the literature in other disciplines concerning the nature of knowledge does in fact address *images* in one form or another.

Images and Cognitive Science

In the cognitive science literature, the term *image* is used in a relatively narrow sense. According to Dennett (1981):

An image is a representation of something, but what sets it aside from other representations is that an image represents something else always in virtue of having at least one quality or characteristic of shape, form or color in common with what it represents. Images can be in two or three dimensions, can be manufactured or natural, permanent or fleeting, but they must resemble what they represent and not merely represent it by playing a role—symbolic, conventional or functional—in some system. (Dennett, 1981, page 52)

The interest of cognitive science in images is whether or not the mind stores or processes something akin to physical images as opposed to verbal propositions, hence the concern with resemblance and not just representation. Of course, even verbal propositions must be experienced within the mind in some form or other. One of the striking characteristics of the research conducted thus far by cognitive scientists is the bipolar framing of the debate over whether there are such things as images. Contrasts are defined as pictorial versus descriptional (Block, 1981), spatial versus syntactic (Kosslyn, 1983), non-formal versus symbolic (Rollins, 1989), a-logical versus logical (Margolis, 1987), concrete versus abstract, continuous versus discrete, holistic versus articulated (Pylyshyn, 1981), and analog versus digital (Schwartz, 1981).⁴

The difference between information storage and processing which is pictorial, spatial, concrete, non-formal, a-logical, continuous, holistic, and analog and that which is descriptional, syntactical, abstract, symbolic, logical, discrete, articulated, and digital has important implications. One way of summarizing the debate lies in the question of whether the mind can be replicated on a computer (Rollins, 1989). Of course, computer *simulations* of simple cognitive tasks are possible (Kosslyn, 1983; Edelman, 1992), but the con-

scious mind is more than the sum of such limited tasks. Edelman (1992) argues that the very term *cognitive science* necessarily implies *cognitivism*, which is the view that the mind manipulates symbols and that this function is independent of the device (brain or computer) on which the manipulation occurs. Varela et. al. (1991), however, admit the importance of cognitive technology as a stimulus for the development of cognitive science but argue that the discipline has gone beyond a purely *cognitivist* program.

The question whether or not the mind can be replicated on a computer is also closely related to the question of Cartesian dualism; that is, whether the mind (*res cogitans*) and body (*res extensa*) are different substances. If such replication is possible, then the mind (software) is indeed different from and independent of the body/brain or computer (hardware), and Descartes was correct. While this particular cognitive science debate has been conducted in terms which are not identical to the concepts of *vednost* and *poznavanje*, the two sides of the debate correspond quite well with the two terms.

As we said in the introduction, it is not clear whether the *mental images* of cognitive science, which in the experiments conducted so far are quite simple, are the same as the *corporate images* of marketing, which most see as very rich representations. Since cognitive science is still in its infancy, it has naturally been concerned with simpler mental processes and tasks than has marketing, and it may be that its use of the term *images* only looks to be different from that of marketing (Kosslyn, 1983). Pylyshyn (1981), one participant in the debate who is skeptical of the role of images in cognition, associates *images* with *imagination*, which is suggestive of the more complex mental processes and tasks which are of interest in the business disciplines.

It seems to me that the single most intriguing property of imagery, and the property that appears, at least on first impression, to distinguish it from other forms of deliberate rational thought, is that it has a certain intrinsic autonomy. ... Sometimes imagery even seems to resist our voluntary control. ... Such responsiveness of the imagination to involuntary processes and unconscious control is one of the main reasons why imagery is associated with the creative process. (Pylyshyn, 1981, page 165–166)

Other areas of cognitive science have dealt more directly with the concept of *images* in its business sense, even though they have not explicitly used that term. One of these concerns memory.

Images and Memory

Current speculation on the mechanism of memory is that it is a *non-local process*; that is, there are no loca-

tions within the brain that can be clearly identified as the repositories of specific memories (Rosenfield, 1988; Campbell, 1989; Schank, 1990; Johnson, 1991; Rose, 1993; Schacter, 1996). In that regard, referring to computer storage—which is very formally structured and the epitome of a *local process*—as computer *memory* may be a misleading anthropomorphism. Likewise, the retention and recollection of specific bits of information about things; that is, knowledge as *vednost*, is an unnatural act that the mind did not evolve to perform well.

Adding new data to memory is not like filing it away in an unused location, as a computer does. Rather, the new data causes a reordering, reconstruction, or reinterpretation of existing data so that it makes some sense. What new data we store in memory, and the ways in which we store it, depends heavily upon the data currently in our memories and the manner in which it has been stored. Thus, it should not be surprising, but rather expected, that individuals remember the same things quite differently. In fact the term *data*, which is quite appropriate and quite useful for computer memories, is probably not very appropriate nor useful for human ones.

... memory is a construct, not a videotape. Presented with the same event, different brains will pick different features to put into their memory structures, and they will build them in different ways. It depends, in part, on what is already in storage. Over the years, memories will get pushed together, the arrangements will shift and change. ... It is only when the output of a number of different brains overlaps that we can take a kind of average and agree to call something reality. (Johnson, 1991, page 165)

Stories. What is actually in the mind is not a memory so much as a plastic representation, pattern, story, or image—the term *image* being an apt description of this method of data storage, which if not necessarily pictorial and spatial is nonetheless concrete, nonformal, a-logical, continuous, holistic, and analog. In short, it is knowledge in the sense of *poznavanje*. In the more recent cognitive science literature pertaining to memory, it is more common to find the term *story* than *image*, but the meanings of the two are not markedly different.

In short, story creation is a memory process. As we tell a story, we are formulating the gist of the experience which we can recall whenever we create a story describing that experience. (Schank, 1990, page 115)

When the mind remembers, it reconstructs a kind of story, fitting together bits and pieces of information about the past, using networks of preexisting knowledge. (Campbell, 1989, page 91)

But in the business and economics literature, *stories* more often explain *what is going on* (as concerning research results, for example) and *images* explain *what is* (as concerning corporations).

Stereotypes. One form of *image* with which we are especially familiar is the *stereotype*, excluding, of course, the pejorative connotations the term often carries (Martineau, 1958).

Thinking about people in stereotypes is a form of cognitive economy. ... It is a way of obtaining the most information about the world with the least mental effort, and it is a natural type of 'reasoning' for us, because our knowledge is organized in memory, not according to the principles of logic, but in such a way as to reduce the complexity of the world, while still being able to make sense of it. The need to be economical is set against the need to be completely rational. (Campbell, 1989, page 119)

Pinker (1997) states this somewhat differently. His *stereotypes* are representative images of the contents of the categories into which we assemble the world. Once we place something in a category, we are able to infer that it shares all of the attributes of the stereotype of that category without our necessarily having observed all of the attributes when we categorized it. Although this can have the undesirable social consequences we usually associate with *stereotypes*, there is an evolutionary advantage to being able to make economical inferences about the likely functioning of the environment. Our stereotypes of the physical world must conform fairly well to it, or we would not survive, but there is less need for our stereotypes of the social world to conform as well.

In the early sixties there was a brief flurry of debate concerning whether or not the images of individual corporations were largely instances of a generic corporate stereotype, since there seemed to be too few differences among them (Tucker, 1961; Hill, 1962). Regardless, even images clearly unique to specific corporations are *stereotypes* by Pinker's definition. Some people's stereotyped images of corporations may work better than those of others, and it may take each of us quite some time to refine our images to improve their performance. As individuals, we may have to make one image work (sub-optimally) for several purposes such as the purchase of a company's products and investment in its stock, since it may not be possible for us to simultaneously know a corporation differently as a consumer and as an investor.

Some in cognitive science have been suggested that *image* is the very basis for *mind*.

My view then is that having a mind means that an organism forms neural representations which can be-

come images, be manipulated in a process called thought, and eventually influence behavior by helping predict the future, plan accordingly, and choose the next action. (Damasio, 1994, page 90)

Although Damasio clearly believes that images are important, he does not attempt to define the term, and uses it in a vernacular sense for the rich representations which form in the mind as a result of *perception* or *recall*. The work in cognitive science to which we referred in the preceding subsection had a more precise definition of *images*. That work was only concerned whether or not *recalled* representations were in the form of images, but did note that such representations occurred in the same location of the brain as *perceptions* (Kosslyn, 1983).

Fictitious memories. Since the gist of an event is retained in memory and not all of the details, incorrect details are often unconsciously supplied to the recollection of the event, as if they had actually been part of it, in order to flesh out the story or image. The retrieval cue by which the memory is elicited and associated implicit memories of which we are not conscious also play roles in shaping the memory (Schacter, 1996). Entirely fictitious events may be created in a process of successive embellishment (Gazzaniga, 1998). There is in fact a link between this aspect of memory and the earlier cognitive science study of images.

Why does retrieving visual images tend to make us feel strongly that we are remembering a real event? Part of the reason is that some of the same brain regions are involved in both visual imagery and visual perception. Since we usually rely on these areas to perceive the external world, it should not be surprising that when we use them to create visual images, the images may feel like the mental residue of actual events. These observations have an important implication: creating visual images may lead us to believe that we are remembering an event even when the incident never happened. (Schacter, 1996, page 23)

The mind's attempts to find order where there is none (Gazzaniga, 1998) is one manifestation of this phenomenon. It is an aspect that is likely to have a strong influence on the interpretation of empirical research in finance, especially when coupled with the tendency to structure statistical tests themselves in forms predisposed to finding significance (Frankfurter and McGoun, 1993). Because the memory encoding process—that is, the way in which we impose order upon our perceptions—is itself a consequence of our preexisting memories, finance research may be directly affected in yet another way. Once we are conditioned to look at things from a certain point of view, we are literally unable, not simply disinclined, to look at

them in any other (Schachter, 1996). Thus there may be a physiological, and not simply sociological, explanation for Kuhn's (1970) research paradigms that specify what it is we "know" and how we are to go about "knowing" more.

If our memories are in the form of stories and images and if our knowledge is *poznavanje* and not *vednost*, the most important consequences from the finance standpoint have to do with decision making. We know that there is an effect on reasoning.

... since knowledge can be retrieved only in a distributed, parcellated manner, from sites in many parallel systems, the operation of reasoning strategies requires that the representation of myriad facts be held active in a broad parallel display for an extended period of time. ... In other words, the images of which we reason (images of specific objects, actions, and relational schemas; of words which help translate the latter into language form) not only must be 'held active in mind'—something achieved by high-order working memory." (Damasio, 1994, page 84)

We also know that emotions play an important role in memory, and hence image, formation via the involvement of the limbic system (Rosenfield, 1988)⁵ and in turn that emotional expression in general and the figurative use of language in particular (including metaphors) depend upon imagery. (Rorty, 1978; Rollins, 1989) Hence, what investors and analysts do and how they describe it (and what financial researchers do and how they describe it) are likely to be far more complex than even behavioral finance has imagined.

Images and Rationality

What we have covered thus far suggests that our reliance upon images to store and process information means that concepts such as *expected return* and *risk* are likely to be more than just quantities and *corporations* and *investments* more than just collections of facts.⁶ But what about rationality, which researchers have long assumed characterizes the process of selecting investments in corporations by ranking them in terms of expected return and risk. Indeed, one definition of economic rationality is the ability to do so with consistency.

De Sousa (1987) makes the distinction between *functional wants* and *emotional desires*, a distinction that finance believes it has been able to sidestep through the concept of wealth. Since *de gustibus non disputandum est*, we cannot say much about utility, which arises from emotional desires. If, however, we regard wealth as a universal instrument for the acquisition of whatever gives us utility, then we need only consider our ability to fulfill the functional want for wealth.

That becomes the criterion for rationality, and emotions ostensibly are not part of the picture. But can we really so simply dispense with emotions?

There is clearly an emotional component in our formulation of expected wealth. We face the *frame problem* of knowing what to include and what not to include in our formation of expectations, and there is no rational and complete way to do this in a finite length of time (Pinker, 1997). Although it appears as if we can rationally determine what is and is not relevant to a decision, we must retrieve things that turn out to be irrelevant, in order to determine that they *are* irrelevant, and without emotion, this process would never end.⁷ We would be paralyzed (de Sousa, 1987). There are cases of particular forms of brain lesions which damage emotions and cause just this sort of behavior (Damasio, 1994). Devlin (1997) draws a clear distinction between *logical* and *rational*, with the former resembling what finance has called *rational* and the latter what it has called *irrational*, or at least *quasi-rational* (Thaler, 1991).

While finance has not had to explicitly answer the question whether the mind can be replicated on a computer, the answer implicit in its traditional research methods—the use of mathematical models and more recently expert systems and neural nets, not to mention the habitual references to *rationality*—is "yes".⁸ Even in behavioral finance, we assume that financial information is stored intact in some location within our minds in much the same way as it would be stored in computer memory. We implicitly assume that people enter into some algorithmic process to yield a decision whether or not to invest in a particular corporation in much the same way that a computer program would arrive at that decision. But if knowledge and knowing are more *poznavanje* and *poznati* than *vednost* and *vedeti*, then the computer metaphor and the research methods consistent with it in finance may have limited ability to explain the behavior of investors and analysts.

Corporate Images

Approaching the notion of image from a very different perspective than that of psychologists, the corporate marketing community has also given a great deal of thought to the topic. In this section, we consider the term *corporate image* and how it has been used in the business literature thus far. Although Barich and Kotler (1991) attribute the first use of the term to Sydney Levy in 1955, they provide no reference, and in a survey of the history of the term, Kennedy (1977) states:

The concept of a company or corporate image was born in the 1950s. It was a development which no one person was attributed with discovering. (Kennedy, 1977, page 150)

At any rate, in 1953 the corporation was being personified.

A business firm may have 'no body to be kicked,' but it does have character. In addition to a separate legal existence, every company develops its own traditions, habits, and reputation which give it individuality. This body of habits and attitudes endows a company with character or personality quite beyond the people who work for it at any given time. (Newman, 1953, page 211)

By the late 1950's, the term *corporate image* had apparently come into widespread use.

There has been a lot of talk about something called the 'corporate image.' Is this just another loose notion—or is the idea an important one? (Martineau, 1958, page 49)

This may have been the result of the publication of a very influential book on the subject by the economist Kenneth Boulding (1956), in which he suggests the concept of a *corporate image*.

A society consists not only of individual persons; it consists of organizations. ... We have already defined an organization as a structure of roles tied together by lines of communication. The existence of such a structure depends on the presence of a "public image" among those who participate in its roles. (Boulding, 1956, page 57)

Defining image

Just what a corporate *image* is, however, has been quite elusive, and there are other terms such as corporate *personality*, *identity*, and *reputation* with which it is frequently confounded. There is no point making yet another attempt here to sort out these terms as others have tried to do (Abratt, 1989; Bernstein, 1991; Gregory, 1991; Mackiewicz, 1993; Bromley, 1993; Schmitt et. al., 1995; LeBlanc and Nguyen, 1996; Fombrunn, 1996). Suffice to say that corporate *image* has the characteristics which would distinguish it as *poznavanje* rather than *vednost* and ties in nicely with the cognitive science literature. Both Boulding (1956)⁹ and the early marketing literature¹⁰ contain quite accurate accounts of mental imagery that only later became widespread in the more scientific literature.¹¹

In the countless definitions and descriptions of *corporate image*, there does appear at least one common characteristic. Corporate images are subjective; that is, they exist in the minds of the members of the corporate audience. And because they are subjective, they are also idiosyncratic, as everyone's perceptions of a corporation and everyone's values through which

they filter these perceptions are different. This is in marked contrast to the corporation in finance, which is quite objective and, on the strength of the "rational and homogeneous expectations" assumption common in finance theory, the same for everyone.

One can, however, find at least two controversies in this literature concerning *corporate images*. One is whether they are simple or complex, but this is not so much of a controversy. Given what was discussed in the previous section concerning the functioning of the mind, some parts of an image may be abstractions and other parts elaborations of the perceptions out of which the image has been formed. The other controversy is whether or not images are real, and this ontological question has important epistemological (and surprisingly also managerial) implications.

Images and Reality

If one agrees with the theories of the mind discussed in the section entitled Images, then a corporate image is indeed real. It is certainly sufficiently real to be consequential.

Image is a representation in the mind. But it is very powerful. It is a 'true reality'. It affects attitudes which in turn affect behaviour. (Bernstein, 1991, page 233)

But the real question is whether *subjective* corporate images *represent* reality; that is, is there an *objective* reality "out there" with which the image is more or less consistent or of which the image is less or more of a distortion? Most seem to believe that there is such an objective reality, as the following selection of quotations illustrates. All of these were taken from books on the subject of corporate images, and the page numbers show that the issue is an important one that is usually addressed very early on.

People do not react with reality. Rather, they react with their subjective knowledge of reality. (Martineau, 1960, page 5)

Corporate reality and public perception are often miles apart ... Corporate image is one link between corporate reality and public perception. (Gray, 1986, page ix)

Often when reputation is discussed, it is in terms of appearances. This raises the question of whether firms with good reputations are really 'good,' or whether they just *appear* to be good. Is it perception or reality that rules the market, or perhaps a little of each? (Sobol et. al., 1992, page 1)

Perception is what counts; it's not necessarily the reality of a situation but what your target audience *believes*

to be reality that creates corporate image. (Gregory, 1991, page 22)

What then is perception and what is reality? The definitive answer to this time-honored question is that sometimes they are the same thing; sometimes they are not; and sometimes it's just hard to tell. (Marconi, 1996, page 5)

Because most believe that a corporate image can be inconsistent with reality or a distortion of reality, it is not uncommon for the whole concept of image—and managerial efforts to influence it—to be viewed pejoratively. The perjorative tone is more notable in some of the earlier literature than in the later literature.

Image-making can be one of the more dangerous types of management panaceas. It gives the false impression that a fundamental change is being made, for creating a new image of oneself seems deceptively like creating a new self. (Finn, 1961, page 137)

The least and most we can hope for is that each of us may penetrate the unknown jungle of images in which we live our daily lives. (Boorstin, 1973, page 261)

Is there or isn't there a reality outside the image? Boulding (1956) admittedly avoids the issue.

Up to now I have sidestepped and I will continue to sidestep the great philosophical arguments or epistemology. I have talked about the image. I have maintained that images can be public as well as private, but I have not discussed the question as to whether images are *true* and how we know whether they are true. (Boulding, 1956, page 16)

But finance certainly believes there is a reality, with, for example, its frequent references to an "intrinsic value" that exists independently of the "market value". But if there is an *objective* reality or an *intrinsic* value, how would we ever know it, since all we have with which to know it are our inherently *subjective* minds and clues left on our *markets*. Countering this essentially Berkeleyian argument is the pragmatic one that there must be something like an objective reality, since some images obviously work better than others. There are certainly assessments of value, for example, which will cause you to lose all of your money.¹² But *something like* an objective reality is not objective reality itself. We run into trouble when our images differ too much from everyone else's or our assessments of value differ too much from the market's. What passes for an *objective* reality in the marketplace is often some sort of average of *subjective* realities. This conclusion was anticipated in the section entitled Images in the quotation from Johnson (1991), a part of which we reproduce here.

It is only when the output of a number of different brains overlaps that we can take a kind of average and agree to call something reality. (Johnson, 1991, page 165)

And Boulding (1956) reached this conclusion as well.

What this means is that for any individual organism or organization, there are no such things as 'facts.' There are only messages filtered through a changeable value system. ... This does not mean, however, that the image of the world possessed by an individual is a purely private matter or that all knowledge is simply subjective knowledge, in the sense in which I have used the word. Part of our image of the world is the belief that this image is shared by other people like ourselves who also are part of our image of the world. (Boulding, 1956, page 14)

Images and Finance

So far finance has not yet produced a definitive statement of what *behavioral finance* is. The closest we can come is a recent survey article "Psychology and Economics" by Matthew Rabin in the *Journal of Economic Literature* (1998). From this article and from those papers taken to be exemplars of the sub-discipline of behavioral finance, we conclude that it is methodically and methodologically similar to more traditional finance. It differs only in a handful of assumptions in much the same way as Lobachevskian or Riemannian geometries differ from Euclidian geometry.

Mainstream economics employs a powerful combination of methods: methodological individualism, mathematical formalization of assumptions, logical analysis of the consequences of those assumptions, and sophisticated empirical field testing. I believe these methods are tremendously useful, and an underlying premise of this essay is that we should strive to understand psychological findings in light of these methods. (Rabin, 1998, page 12)

But as we hope to have shown in this paper using the *corporation* as an example, finance assumes a form of knowledge and knowing that is inconsistent with the way we are discovering the mind works.

It is far more likely that we store and process information in a form which is pictorial, spatial, concrete, nonformal, a-logical, continuous, holistic, and analog and not one which is descriptive, syntactical, abstract, symbolic, logical, discrete, articulated, and digital. What we do form in our minds are images of concepts, like the corporate images which have long been of interest in marketing. We are not able to leave our consumer selves at home when we set off to work as investors—we use images, and probably the same images for both tasks.

The mind cannot be replicated on a computer. Yet that assumption is implicit in finance's traditional research methods—the use of mathematical models and more recently expert systems and neural nets, not to mention the habitual references to rationality.

If all of our knowledge is in the form of subjective images, the closest we can come to an objective fact is something most people would agree on. This is not to say that there are not some standards by which we can evaluate the efficacy of the images upon which we base our decisions; that is, we can tell whether our decisions are good or bad and whether our images work or not. But whether or not they work is a matter of whether or not they differ too much from everyone else's, since what passes for an *objective* reality is some sort of average of *subjective* realities. Hence, we need to spend much more time in our finance research on how individuals acting collectively set the standards by which they succeed or fail, rather than assuming that the standards pre-exist, embedded in something “out there.”

In short, the mind can and does work differently than traditional finance assumes. And the differences between the behavioral assumptions of traditional finance and the supposedly more realistic ones of today's behavioral finance are at best superficial. Knowledge and knowing are likely to be profoundly different than what we have incorporated in our extant models, both traditional and behavioral, and to truly understand what is going on we must go beyond behavioral finance to address these differences.

Notes

1. Also in Slovene, to know a skill is *znati*, and such knowledge is *znanje*. We will not be concerned with this distinction in this paper, but the difference between “knowing that” (*vednost*) and “knowing how” (*znanje*) has a venerable history. Devlin (1997) refers to this difference in contrasting Descartes and Pascal, arguing that the former has inappropriately dominated Western thought.

The first rule was never to accept anything as true unless I recognized it to be certainly and evidently such: that is, carefully to avoid all precipitation and prejudgement, and to include nothing in my conclusions unless it presented itself so clearly and distinctly to my mind that there was no reason or occasion to doubt it. (Descartes, 1960, page 15)

The heart has its reasons that reason does not know. (Pascal, quoted in Devlin, 1997, page 178)

This distinction also resembles that between conscious, explicit, declarative memory and unconscious, implicit, procedural memory (LeDoux, 1996).

At this point we should emphasize that we are not talking about the difference between *knowing* and *understanding*. Like English, Slovene also has separate words for “to understand” (*razumeti*) and “understanding” (*razumevanje*).

2. Cognitive science is a contemporary synthesis of psychology, linguistics, philosophy, the neurosciences, and artificial intelligence that some consider a sub-discipline of psychology (Kosslyn, 1983). Others, however, have argued that as a result of the creation of sub-disciplines such as cognitive science, psychology itself as a discipline has disappeared (Gazzaniga, 1998). Varela et.al. (1991) refer to cognitive science as the sciences of mind, reflecting its multidisciplinary parentage, and do not give precedence to psychology. They also point out that cognitive science is an intersection of the natural sciences, social sciences, and humanities.
3. And of course of its parent disciplines of psychology, linguistics, philosophy, the neurosciences and artificial intelligence as well.
4. The debate is not a simple either-or issue. Of course some believe that all knowledge must be in one of the forms (Pylyshyn (1981) supports all descriptional and Damasio (1994) all pictorial), even though sometimes knowledge may seem as if it is in the other form. But some believe that some knowledge can be in one form and some knowledge in the other (Kosslyn, 1983), and some believe that combinations of the two forms are possible (Fodor, 1975). It may also be that different individuals store and process their knowledge in different forms (Forisha, 1983). Pinker (1997) points out that if there are two forms, we must be able to transform the pictorial into the descriptional:

Pictures are ambiguous, but thought, virtually by definition, cannot be ambiguous. Your common sense makes distinctions that pictures by themselves do not; therefore your common sense is not just a collection of pictures. If a mental picture is used to represent a thought, it needs to be accompanied by a caption, a set of instructions for how to interpret the picture—what to pay attention to and what to ignore. ... When vision leaves off and thought begins, there's no getting around the need for abstract symbols and propositions that pick out *aspects* of an object for the mind to manipulate. (Pinker, 1997, page 297)

5. The limbic system is a set of evolutionarily primitive brain structures thought to be the seat of emotion. Recent anatomical research has cast doubt on the existence of a “limbic system”, and emotions may not be so easily localized within the brain. The hippocampus, which is a part of the “limbic system” plays a major role in contextualizing memories; that is, forming the representations we have termed *images*. Emotions enter the process when the amygdala (another part of the “limbic system”) generates an unconscious emotional response to a stimulus at the same time that the hippocampus generates an explicit memory in response to the same stimulus. Through association this emotional arousal in the present can reshape the explicit memory of a past event (LeDoux, 1996).
6. Specifically concerning images and expectations:

Our image of the consequences of our acts is suffused with uncertainty to the point where we are not even sure what we are uncertain about. (Boulding, 1956, page 84)

7. When there are costs associated with optimizing, we face the problem of optimizing our process of optimizing, and so on *ad infinitum*. Economics refers to this as the “regress issue”, and the literature concerning it is summarized in Conlisk (1996).
8. Notwithstanding the anthropomorphisms of *expert* systems and *neural* nets.
9. “What, perhaps, is even more destructive to the view that makes a sharper distinction between facts and values is that according to the theory of the image, our very message input depends to a considerable extent upon our existing value structure. What this means, in a sense, is that the way in which the total image grows determines or at least limits the directions of future growth. In

- this growth process, however, the factual and the valuational images are inextricably intertwined" (Boulding, 1956, page 174).
10. "Because the human mind can handle only so many complexities at one time, we tend to sort and classify these impressions and abstract a meaning from them. This abstracting process may take shape as an 'impression,' or an image of the source of stimulation. Once having formed the abstraction, we then tend to sort and classify any additional impressions as they relate to this abstraction: favorable messages we accept as being correct; unfavorable messages we reject as being incorrect" (Hill, 1962, page 73).
 11. Perhaps this is an example of a rather perceptive and prescient "folk psychology".
 12. "All this does not mean that we have to retreat into solipsism, that is, the doctrine that there is no reality outside the mind of the philosopher. ... We are saved from solipsism partly by feedback, partly by the perception that our image is a public image" (Boulding, 1956, page 166).

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