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On time: contributions from the social sciences

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Abstract

This paper provides a brief review of the anthropology and psychology literature as it relates to time, an important variable in finance. First, the paper discusses ways that individuals represent time, and introduces cultural variations in the perception of time. Then the experience of time passing, and behavioral pace, is discussed. The succession of time and the orientation toward past, present, and future, are described. The paper may provide implications for academics whose finance research is related to behavior over time.

1. Introduction

Financial advisors and individuals rely on time value calculations for planning how to spread limited financial resources across a lifetime of needs. An individual's perception of the future can influence his or her attitude toward planning, and perceptions about the passage of time can influence the urgency that the individual feels toward planning. These attitudes and perceptions can also influence current savings and spending behavior, which can support or hamper the individual's attempts to achieve financial goals. Although time is an important variable in time value calculations, financial researchers have paid little attention to the way that individuals perceive and experience time.

The purpose of this paper is to provide a brief review of the temporal anthropology and psychology literature streams and to discuss possible implications for finance researchers. The paper is organized as follows. Part II discusses ways that individuals represent time, and introduces cultural variations in the perception of time. The experience of time passing, along with behavioral pace, is discussed in Part III. In Part IV, the succession of time, time orientation, and attitudes toward the past and the future, are described. The paper concludes in Part V.

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Fig. 1. A Western representation of time.

2. Representing and measuring time

Time is an important variable in time value calculations, a variable so significant that financial advisors and educators often illustrate the time horizon under discussion. However, cultural differences exist in the ways that individuals envision time. Further, the precision of time measurement varies among cultures. This section will describe those variations and discuss possible implications for researchers.

2.1. Representing time

Educators and financial planners usually represent a specific holding period or period of annuitization by depicting a time line. Such a depiction generally is consistent with the individual's concept of time. Many individuals believe that the time continuum has a beginning before which, time did not exist. Scientists associate this beginning with the big bang, while some religions associate this beginning with Creation (Hawking, 1988). Individuals tend to think of time flowing in a forward-moving, linear fashion (Melges, 1982). Fig. 1 presents a representation of such a time line, starting with the big bang and extending forward.

The representation of time described in the prior paragraph, and presented in Fig. 1, is associated with Western reasoning. However, the entire world does not adhere to this Western representation of time. For example, speakers of Bantu, a widespread language in central, eastern, and southern Africa, depict time quite differently. Bantu-speaking tribes in South Africa, such as the Hehe in Southern Tanzania, believe that time began with a Supreme Being as the source of the universe. These groups represent time as a revolving sphere that rolls forward along a spiral path into the endless future (Msumange, 1998). The revolving sphere may be similar to the rotating earth, the source of day and night, while the spiral can represent the agricultural seasons or cycles of the moon. An example of how an African may represent time is presented in Fig. 2.

So although Westerners and Africans depict time differently, both cultures share two fundamental ideas concerning time. First, time had a beginning, before which, time did not exist. Second, time is forward moving. However, neither of these ideas is universal.

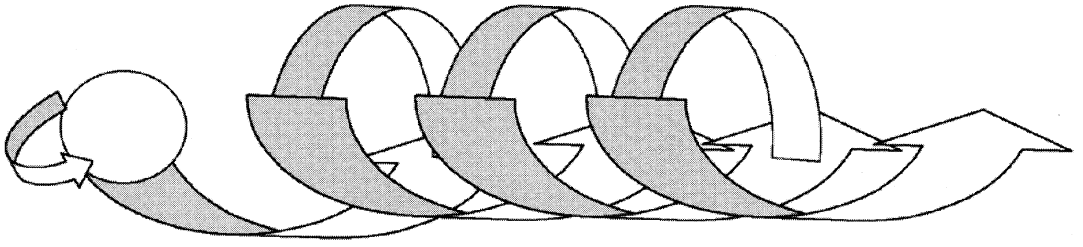

Fig. 2. An African representation of time.

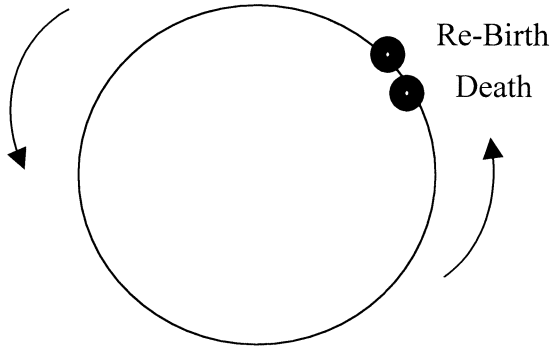

Fig. 3. A Hindu representation of time.

Not all cultures agree that the continuum of time has a beginning. Hindus believe that time has existed forever. They envision time as a revolving circle of birth, death, and rebirth. They feel a strong connection to prior and future revolutions of the circle, as they believe that good and bad conduct in one life is rewarded or punished in the next life (Levinson, 1998). An example of a Hindu's representation of time appears in Fig. 3.

The cultures discussed thus far have agreed that time is a succession of events in the past, present, and future. However, the notion of the forward movement of time is not universal across cultures. For example, neither the Hopi Indians nor the people of the Trobriand Islands have words that distinguish between past, present, and future. Rather than a linear representation of time, these cultures see time in a unified holistic pattern (Melges, 1982). Both the past and the future are blended with, and indistinguishable from, the present. These cultures see time as a fabric with an interwoven pattern of past, present, and future. Fig. 4 is an example of such a depiction of time.

So cultures vary in the ways that they represent time, reflecting such factors as religious

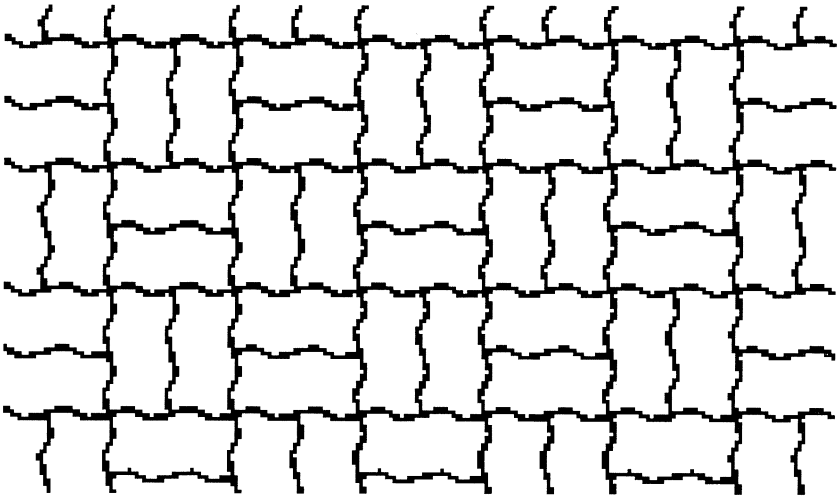

Fig. 4. A Hopi representation of time.

beliefs and the physical environment. While the culture can provide a general framework for envisioning time, each individual may envision a unique variation on the general cultural representation. Of course, culture provides a framework, rather than a dictate, for envisioning time, and individuals may adopt representations or ideas usually associated with other cultures in constructing their own representations. An individual may also use different representations in different contexts, for example, the school year may be envisioned differently from the agricultural year.

2.2. Measuring time

The measurement of time is also a product of the individual's culture. The accuracy of the measurement is associated with the characteristics of a geographical area. Additionally, researchers have found other factors that are associated with clock accuracy. These time measurement issues are discussed further in this section.

In the Western representation of linear time, demarcations on the line represent uniform measurements, signifying specific time periods such as days, months, years, or decades. The time line will usually end at some specific time associated with the planning period, such as an assumed retirement or mortality age. Time periods between critical points are clearly and uniformly represented.

In the African culture, demarcation of time is less precise than in the Western world. Time is organized in terms of natural events that occur cyclically, such as the dry or rainy seasons, the agricultural cycles, and the cycles of the moon. Shorter time periods are distinguished by the position of the sun, and the range of time in the night that a particular bird sings, crows, or clicks. Important events in the past, such as wars, also provide temporal information.

Levine and Norenzayan (1999) found significant differences in 31 countries' temporal precision, as measured by the accuracy of public clocks. Switzerland, Italy, Austria, and the U.S. were the top four countries in clock accuracy. Greece, Indonesia, and El Salvador were at the bottom of the list. Levine and Norenzayan found that clock precision is related to the industrialization of the country as well as its population and economic health.

Some philosophers and economists have posited that a society's temporal imprecision deters its industrialization. For example, Msumange (1998) suggested that the inexactness of time measurement in Third World countries, such as Africa, has delayed the economic development of the area. He suggested that adoption of a precise "mathematical concept of time" is necessary for future development (p. 11). However, in the U.S., industrialization and the workings of the factory came first, and drove the need for a temporal precision that had been previously unimportant (Hunt & Hait, 1990).

2.3. Summary

Cultural perspectives influence the ways that individuals represent time. The way that a culture represents time is a product of the religious and scientific beliefs of its population. In the next section, we will see that culture, as well as other variables, influences other aspects of the ways that individuals experience the passage of time.

3. The duration of time

Individuals vary in the ways that they experience time passing, and in the speed of their behavioral pace. *Duration* refers to the subjective experience of time, as uniquely perceived and interpreted by each individual. Individuals use an inner tempo to judge how much time has elapsed. This inner tempo influences observable behavior, such as walking pace. In this section, inner tempo and observable pace are discussed, along with implications for advisors, educators, and researchers.

3.1. Inner tempo

Inner tempo, also referred to as inner or temporal pace, is the individual's experience of the passage of time. The literature describes the experience of time passage as "the appreciation of duration" (Frederickson, 1988, p. 63). Researchers assess participants' inner tempo by asking participants to estimate the length of time that elapsed during a prior task. If the individual's internal pace is fast, then external clock time seems slow (Melges, 1982). Psychological typing has ascribed internal pace to personalities, with Type A personalities described as fast paced, time pressured workers who think and act quickly, and Type B personalities described as steady workers unpressured by time (Rao, Reddy & Samiuliah, 1997).

Time is valuable to highly motivated and high achievement-oriented individuals, who tend to be time possessive and concerned with the appropriate use of time. Individuals judge time to have elapsed more quickly when they are busy than when they are idle, although this is only true for individuals who are achievement oriented (Meade & Singh, 1970). Likewise, individuals judge that time has elapsed quickly when they have made progress toward a goal. However, individuals who are not achievement oriented make similar estimates of time regardless of whether they have made task progress (Meade & Singh, 1970). Individuals judge that a shorter period of time has elapsed when they are interested in a task, as compared to when they find the task uninteresting (Rotter, 1969).

Deliberate practice and naturalistic decision-making literature indicates that individuals with high levels of expertise can experience a quickened inner pace at critical points. Ericsson and Smith (1991) reported tennis players' descriptions of external time slowing during crucial moments in an important game. Klein (1998) studied experts, such as fire-fighters and aviators, who make life or death decisions under extreme time pressure. Experts reported that 'time stood still' at critical times as they considered large amounts of information and selected among alternatives.

Some of the earlier work in the temporal psychology area evolved from medical practitioners, who observed temporal distortions in the thinking of patients with psychiatric disorders. Time moves more slowly in depression (Wyrick & Wyrick, 1977), while manic patients experience time moving more quickly (Melges, 1982). Acutely psychotic patients experience a sense of timelessness, or disconnection from the experience of time passing (Melges). Environmental factors such as temperature changes, as well as the use of stimulants and psychedelic drugs, can speed up the internal clock. Sensory deprivation and hypnosis can also induce changes to the sense of psychological time (Melges).

Researchers have studied the accuracy of the inner clock as an indication of other personal

attributes. Tsukanov (1991) studied the "quality of the inner clock," or accuracy of participants' time estimates. He associated accuracy with innate intelligence, using academic success in the Soviet system as a proxy for intelligence. Tsukanov's participants consisted of (a) scientists, (b) university students, (c) poorly performing secondary education students, and (d) children diagnosed with very low intelligence. When judging the duration of a very short elapsed time, the scientists performed most accurately, and the low intelligence children least accurately. However, because the researcher did not consider other variables such as motivation, goal orientation, and maturity in the analysis, the conclusion that the ability to estimate the duration of time is related to intelligence is suspect.

Individuals, despite their personal experiences of time, rely on clock speed as the accurate determinant of elapsed time. Rotter (1969) found that, by secretly adjusting clock time, test administrators could manipulate participants' estimates of temporal duration. Participants mistrusted their own estimate of a task's duration, adjusting their estimates after obtaining access to a clock. These results suggest that individuals may be aware that their experiences of duration can be inconsistent or situational.

3.2. Observable pace

Historians attribute the importance of time in the U.S. to the Industrial Revolution, when manufacturing was coordinated among machines and workers, according to rigid factory schedules. The workings of the factory required a new precision, and punctuality necessitated the invention of Seth Thomas Clock Company's wind-up alarm clock in 1876. The impact of the Industrial Revolution permeated the American culture, and new sports created after 1860, such as basketball and football, were ruled by the clock, in contrast to un-timed earlier sports such as baseball (Hunt & Hait, 1990). The newly increased value of time spawned a new science of time and motion studies (e.g., Taylor, 1947). As efficiency became more important, cultural pace increased.

Hall (1983) observed that cultures vary in overall pace, and compared the characteristics of fast and slow paced cultures. He described a fast paced, monochronic time culture, such as the U.S., as one run by the clock, focused on tasks and schedules rather than on people. The slower paced polychronic culture, characteristic of the Third World, is run by relationships among people and does not consider time as a commodity that can be wasted. These descriptions parallel the psychological types A and B of individual personalities mentioned earlier.

Levine (1997) has studied the pace of life in various geographical locations for the last twenty years, and his observations have extended those of Hall (1983). Levine defined the pace of a location as the overall speed of experiences there, and measured walking speed, clock accuracy, and the average time taken by a postal clerk to fill a stamp order. Findings indicated that faster pace is a function of industrialization, population density, a healthy economy, and a cooler climate.

Readers may be interested in the relative pace of U. S. life. Of the 31 countries in the Levine (1997) study, the U.S. ranked 16th in overall pace. The fastest paced locations were in Switzerland, Ireland, Germany, and Japan. The slowest ranked cities were located in economically underdeveloped countries, El Salvador, Brazil, Indonesia, and Mexico. Western European countries and Japan had increased in speed compared to similar 1980 data. Meanwhile, the U.S. had increased in walking speed, but decreased in the other two measures since 1980.

The pace of the surrounding environment can influence the temporal pace of the individual. An American visitor to Switzerland, Ireland, Germany, or Japan will notice themselves speeding up to keep up with the faster environment. Most visitors to tropical islands must make an effort to slow down to the pace of the environment (Levine & Norenzayan, 1999).

Emphasis on efficiency and productivity is at odds with quiet reflection necessary for thoughtful learning and planning. Experts have indicated that for learning to take place, individuals must reflect on prior experiences, build on positive feelings, deal with negative feelings, and re-evaluate the experience based on those reflections (Boud, 1993). In fact, Fidelity Group of Funds' Peter Lynch recently suggested that advisors need to "slow down" and educate as well as advise clients so that they can make rational decisions (Koco, 2000, p. 3). Clearly, finance practitioners recognize that pace can have an impact on behavior.

3.3. Summary

An individual's sense of time, and behavioral pace, can vary depending on the situation, and patients with psychiatric disorders experience temporal distortions. Overall pace varies among cultures, and is related to industrialization as well as to population density, the economy of the area, and the climate. In the next section, we will discuss a second aspect of temporal experience, succession.

4. The succession of time

Cultures that distinguish between past, present, and future tend to agree that the present moment separates the past from the future. *Succession* is the individual's perception of past, present, and future along a forward flowing time sequence.

Researchers have found that individuals tend to have a predominant temporal orientation of past, present (infrequently), or future. Individuals provide clues regarding their temporal orientation in their speaking and writing. Psychologists agree that the frequency of a particular verb tense is an indication of a participant's or patient's temporal orientation. In research, analyzing the frequency of verb tense during a taped interview is one common technique for determining temporal orientation (e.g., Frederickson, 1988). Several researchers have designed questionnaires that enable respondents to select expressions that most accurately describe their feelings about the past, present, and future (e.g., Braley & Freed, 1971). Meade (1971, p. 177) asked participants to tell stories based on present tense sentences for example, "D. S. receives his degree today," then categorized the stories as to the temporal orientation of the major theme.

Cultural studies provide some clues for understanding differences in the temporal orientation of individuals. Meade (1971) studied male college students in the U.S. and India, and found significant differences in temporal orientation between the two groups, with the students in India past oriented and the Americans future oriented. Meade (1972) continued his cross cultural comparison by studying seven Indian subcultures, and found that three of the Indian subcultures exhibited a future orientation. The past oriented subcultures were more likely to ascribe to the Hindu belief that an individual's own acts or personal efforts are

un-related to lifetime achievement. These beliefs may explain why a young man might be unconcerned with planning for his present life's future.

Meade also found that the temporal orientation of a culture is related to its members' motivation and attitudes toward work. Members of the future oriented subcultures scored more highly on a motivational scale than members of the past oriented subcultures (Mead, 1972). The future oriented Indian subcultures and Americans were also more likely to use references to personal motivation, work, or effort.

4.1. Focus on the past or past-present

Calabresi and Cohen (1968) categorized attitudes toward time, including the temporal orientation characteristics of each category. They found that past orientation is typically characteristic of *time anxious* individuals. Associated characteristics include a need to control time, discomfort thinking about the future, and anxiety about the passage of time. These individuals tend to adhere to schedules and value routine.

Researchers have found that a past orientation frequently is inconsistent with psychological well being. Past orientation has been associating with coping problems, inability to delay gratification, and poor self control (Melges, 1963). Medical researchers have observed significantly more preoccupation with the past among depressed patients as compared to a control group. Depressed patients tend to feel hopeless about the future. Their thoughts of time past also extended further back into the past than the temporal thoughts of nondepressed individuals (Wyrick & Wyrick, 1977). When Braley and Freed (1971) compared psychiatric outpatients to a control group, the researchers found that the outpatient group was significantly past-present focused, while the control group was significantly future focused.

The ways that all individuals view their pasts are influenced by their interpretations of the present. Schkade and Kilbourne (1991) studied hindsight bias, a reinterpretation of the past based on a later outcome. The researchers found that more hindsight bias occurred when participants were surprised or disappointed by the outcomes, and when outcomes were negative rather than positive. These findings imply that later outcomes can color individuals' views of their pasts.

Regardless of the individual's primary temporal orientation, negative past experiences may serve as a reminder of risk, and prompt risk averse behavior. In a simulated study of investment decisions, Thaler and Johnson (1990) found that participants with previous wins made different decisions from those participants with previous losses. The findings suggest that individuals increase their tolerance for later risks after a successful risk taking past, and reduce their risk tolerance after an unsuccessful risk taking past. As Tversky and Kahneman (1986) pointed out, if an individual does not have a history or recollection of a negative event, that individual will expect that the event's likelihood is low. If a loss or negative event is recalled easily, the individual is more likely to consider and alleviate downside risk. An individual with both negative experience investing, as well as a past orientation, would be expected to be very risk averse, although there is currently no empirical research in this area to substantiate this hypothesis.

Thaler and Johnson's (1990) findings that investors reduce their risk tolerance after an unsuccessful risk taking past seems to contradict the behavior of rogue and day traders. Rogue traders increase the stakes with each prior loss, a phenomenon that Shefrin and

Statman (1985) coined "get-even-itis." The rogue traders had significantly higher stakes at risk than the student participants in the Thaler and Johnson gambling simulations, in fact these traders' entire livelihoods were at risk. The risk involved may increase the traders' adrenaline, which could increase their trading pace. The rogue traders also may be more likely to be Type A, and have a short time perspective, as well as exhibit optimism bias and overconfidence, concepts discussed further in the following section. Further study in the temporal psychology area may provide clues to identify potential rogue traders and the circumstances under which rogue trading may begin. The study may also provide further insight into the behavior of day traders.

4.2. Focus on the future

Psychologists traditionally have recognized the importance of an individual's vision of the future. Kelly's (1955) personal construct theory suggested that anticipation of future events is the primary focus of individual behavior and decision-making. Maslow's (1954) hierarchy of needs implies a present orientation in satisfaction of lower-level needs such as a food and safety, and a future orientation for the higher-level needs of achievement and self-actualization. Even as he discussed finding concrete meaning in the present, Frankl (1963, p.166) spoke of striving toward the future, "the call of a potential meaning waiting to be fulfilled. . . " . Kübler-Ross (1999), who spent her scholarly life working with the dying, maintained a future focus, denying the existence of death, asserting that death is simply a passage to an after life.

Individuals with a future orientation are not only more likely to be emotionally healthy, but also more self satisfied and in control, compared to their past oriented counterparts. Braley and Freed (1971) found that future focused outpatients, compared to past-present focused outpatients, expressed significantly more satisfaction with themselves. When asked their ideal temporal orientations, both the past and future oriented groups did not differ significantly, agreeing on the preference for a future orientation. Future orientation has been associated with coping skills, ability to delay gratification, and self-control (Melges, 1963).

A future orientation can be unhealthy if the individual does not perceive a sense of flow from present to future. Braley and Freed (1971) found that of their control group, those with extreme future orientations were more dissatisfied with themselves. Braley and Freed cautioned that "if the temporal orientation is focused too far into the future, the person fails to make sufficient contact with the present to establish a comfortable, and meaningful, sense of continuity" (p. 38). This observation suggests the importance of setting shorter-term as well as longer-term goals, and in showing that a client can, over time, meet long term goals.

Orientation on the present or future is typically characteristic of individuals with *time possessiveness*, a Calabresi and Cohen (1968) category of temporal attitudes. Associated characteristics include greed toward time, upset over the passage of time, intolerance of wasting time, and disinterest in thinking of the past.

A natural bias toward optimism, or wishful thinking, can affect individuals' views of their futures (Weinstein, 1980). Behavioral economists have identified investors' overconfidence in their predictions of the future, as well as over-reliance in the past as a predictor of the future (Kahneman & Riepe, 1998). Individuals rely on their pasts when forming their expectations of the

future, but only to the extent that the past supports what they would like to believe. The further into the future that the individual considers, the greater the optimism bias (Björkman, 1984). Ito (1990) found that optimism bias varies based on individual characteristics and goals, despite similar past experiences. Because of optimism bias, adults can develop persistent positive expectations of the future despite past negative experience (Anderson & Goldsmith, 1994). As a result, they are willing to assume higher risks for longer term investment horizons.

Planning activities are a means of attempting to control the future. In fact, "often the planning activities can give an exaggerated feeling of control of future events" (Björkman, 1984, p. 35). Thus planning can contribute to an individual's feelings of overconfidence about future events.

Individuals weigh the strength of negative past experience against the desire to be optimistic. Individuals with both a past temporal orientation and past negative experience may be more likely to develop pessimistic expectations of the future. However, no study has combined temporal orientation with past experience and future expectations.

Researchers have confirmed that time orientation and pace are inter-related. Type A personalities are not only fast paced, but also preoccupied with future deadlines (Rao, Reddy & Samiuliah, 1997). Researchers have found that faster temporal pace is more likely to be associated with future oriented individuals (Siegman, 1961). Wyrick and Wyrick (1977) found that the greater the past- predominant orientation, the slower the temporal pace, and Frederickson (1988) found a significant inverse relationship between past temporal orientation and fast temporal pace.

4.3. Summary

Succession refers to the sense of past, present, and future, and individuals tend to have a dominant focus, or temporal orientation, toward the past or future. An individual's temporal orientation can be associated with culture, personality type, and psychological well being. Researchers have confirmed that time orientation and pace are inter-related.

5. Conclusion

Much about market behavior remains unexplained by the traditional finance literature. This paper has looked to the anthropology and psychology literature to understand more about what is known about time, an important factor in finance. In this concluding section, possible implications of this literature for financial researchers are discussed.

This paper began with a discussion of cultural representations of time. Finance researchers model financial changes across a time horizon, creating 'market time' representations. Finance researchers in the West have gone beyond the linear Western concept of time in modeling financial market behavior. Nonlinearity, business cycles, and structural changes that shift market movements across time are all commonly accepted. In all fields, researchers need to be aware of their own cultural biases. The extent that a researcher's own representation of time can constrain attempts to model market time is an interesting challenge for researchers.

The paper continued with a discussion of pace, which could have an impact on financial behavior. The research tells us that a fast paced individual is more likely to make quick

decisions and to take immediate action. We also know that individuals adjust their temporal pace to match the environment. In the context of securities trading, a fast paced environment may foster higher trading levels and more frequent trading activity. A day trader may trade more frequently in a fast paced group environment than in solitude. Research on the impact of individual and environmental pace on trading behavior might provide some insights into differences in trading volumes.

Environmental factors that quicken pace could also influence market behavior by accelerating trading. For example, psychologists know that a cold temperature encourages a faster pace, and the anthropologists have found an association between a cooler climate and faster cultural pace. In a trading environment, simply lowering the temperature might encourage a faster pace. Wafting a tempting aroma of coffee to encourage caffeine intake might also step up the pace. Although the marketing literature has looked at the relationship between sales environments and sales performance, this idea has not been raised in the finance arena. Whether simple changes in the environment could lead to changes in trading volume and speed is not known.

Finally, this paper discussed temporal orientation. Finance researchers have long recognized the importance of expectations of the future on financial behavior. Much work in finance has been done to assess the expectations of the aggregate market. Knowing the relative representation of past and future oriented individuals participating in the marketplace may prove helpful in explaining aggregate formation of expectations. Study in the area of temporal orientation also may provide insight into the degree and direction, indicating optimism or pessimism, of market reactions to events.

Further research in the temporal psychology area may also provide additional insight into market behavior. One academic has suggested that increasingly widespread use of antidepressants for psychological treatment may be associated with recent market behavior. As indicated earlier, depressed patients experience a slow inner tempo, and exhibit a slow behavioral pace. Treatment of depression tends to improve the patient's expectations of the future, as well as to increase the patient's pace. We already know that optimism is associated with increased risk tolerance. Again, this might result in increased willingness to participate in the market, as well as willingness to pay higher prices in anticipation of high returns. Nesse, a psychiatry professor, has speculated that the recent unusually long bull market may be related to an increase in the use of antidepressants, especially by well-to-do, highly stressed individuals. He suggested that "If investor caution is being inhibited by psychotropic drugs, bubbles could grow larger than usual before they pop, with potentially catastrophic economic consequences" (Johnson, 2000).

This article raised some possible applications of temporal psychology to problems typically studied in finance. Researchers are encouraged to consider other roles that representation, pace, and temporal orientation may play in their areas of interest.

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