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TIME AND SPACE IN STRATEGY DISCOURSE: IMPLICATIONS FOR INTERTEMPORAL CHOICE

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ABSTRACT

Research Summary: When describing the future, executives draw analogies between time and space (“we’re on the right path,” “the deadline is approaching”). These analogies shape how executives construe the future and influence attitudes to action with long-term benefits but short-term costs. Ego-moving frames (“we are approaching the future”) prompt a focus on the present whereas time-moving frames (“the future is approaching”) underscores the advent of the future as inevitable. Ultimately, action that prioritizes long-term returns depends both on how executives conceive of the future and whether they believe they can engender favorable outcomes. This balance between recognizing the inevitability of the future (time-moving frame) and the capacity to shape outcomes (control beliefs) stands in contrast to the more agentic forms of discourse that are dominant in strategy.

Managerial Summary: Executives often prioritize maximizing immediate returns over investing to build a long-term competitive advantage. How they think about the future offers one explanation for this short-termism. This paper distinguishes two ways of framing the future with implications for decision-making. Are we approaching the future (the ego-moving frame), or is it approaching us (the time-moving frame)? As long as executives have confidence in their ability to achieve forecasted results, they focus on long-term returns in their decision-making when they recognize the advent of the future as inevitable (the time-moving frame). In contrast, though executives often use the ego-moving frame to show that they are active agents, they weigh future returns less heavily when framing the future in this way.

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When corporate executives talk about the future, they routinely employ the vocabulary of space and motion. For instance, “to accelerate performance improvement,” Procter & Gamble is “taking an important strategic step forward” (Lafley, 2014), while Pfizer is “on the right path” and “continues to move forward to having a pipeline that is both robust and sustainable” (Read, 2014). Using spatial language to describe the future is not incidental. The physical realities of space and motion help people conceive of intangible constructs, such as time (Lakoff and Johnson, 1980). Linguistics research points to two distinct ways of experiencing time (Boroditsky and Ramscar, 2002): the time-moving frame, in which the future ‘happens’ and moves towards the speaker (e.g., “the deadline is approaching”), and the ego-moving frame, in which an agentic speaker moves towards the future (e.g. “we are approaching the deadline”).

How executives construe the future is a core issue for strategy. Firms often face a tension between managing short-term earnings and investing for the long term (Litov, Moreton, and Zenger 2012). Spatiotemporal language—despite featuring prominently in corporate discourse—has remained under the radar of strategy scholars. The dominant explanations in strategy as to why executives prioritize the short- or long-term consequences of their decisions rest on incentives (Coles, Daniel and Naveen, 2006). Nonetheless, executives adopt short-term strategies even when long-term compensation plans are in place (Financial Crisis Inquiry Commission, 2011). Executives do not always respond rationally to incentives, and there is good reason to delve deeper into the subjective, constructed nature of time and its implications for economic decisions (Bluedorn, 2002; Kaplan and Orlikowski, 2013). Analogies between time and space are one important way through which time is constructed in the mind.

In this paper, I ask: Do analogies between time and space reflect, and even influence, how executives address the trade-off between the short and long term? Field evidence in

linguistics associates time-moving frames with greater conscientiousness and attention to pending events than ego-moving frames (Duffy, Feist, and McCarthy, 2014). In essence, the future seems to loom larger when it ‘happens’ to us. However, the time-moving frame risks a sense of fatalism. Strategy scholars note that a sense of agency—in particular, the perception that one can actively influence events and their outcomes—prompts long-term planning and action (Hodgkinson, 1992). As Bandura (2000: 120) contends, “Unless people believe that they can produce desired effects and forestall undesired ones by their actions, they have little incentive to act.” Thus, I argue that corporate executives prioritize projects with long-term returns both when they recognize the advent of the future as inevitable (the time-moving frame) *and* when they trust their ability to achieve forecasted results (control beliefs). Temporal framing and control beliefs are simultaneously important in influencing how managers address the trade-off between the short- and long-term.

I conduct a mixed methods study. The first study sheds light on firms’ use of spatial language in their calls with analysts and informs propositions, which I investigate in subsequent studies involving managers and finance professionals. I assess whether time- and ego-moving temporal frames are associated with different orientations towards the future (Study 2) and link frames and control beliefs to decision-making in the face of a trade-off between short-and long-term returns (Study 3). A supplementary study highlights that investors are similarly sensitive to the way in which the future is framed. Investors support long-term strategies when these are communicated using language that underscores the advent of the future (time-moving frame) as well as the capacity of the firm to shape future outcomes (control beliefs).

The contribution is an understanding of intertemporal choice in strategy that illustrates the role of spatial cognition in addressing the tension between the present and the future. Spatial language reflects and structures perceptions of the future in concert with other

psychological attributes. The implications are provocative both for managerial decision-making and for communicating with the markets. Whereas strategy discourse conventionally emphasizes the agency of the firm, agentic discourse has to be counterbalanced with an understanding that the advent of the future looms large.

SPATIAL PERCEPTION AND TIME CONSTRUAL

Imagine that a meeting originally scheduled for next Wednesday is moved forward two days. On which day will it now take place? When this question is put to English speakers, approximately 50% answer “Monday”, whilst 50% answer “Friday” (Ramscar, Matlock, and Dye, 2010). Ambiguity arises because people conceptualize space and time in different ways, leading to divergent understandings of what “moving forward” means when used in relation to time. Monday answers occur when respondents interpret the question through a time-moving frame: Moving the meeting forward means it moves closer to the listener. Friday answers occur when respondents interpret the question through an ego-moving frame: Moving the meeting forward means rescheduling it to a later period because the self (or, ego) moves through time and the meeting is displaced a further two days ahead of the self (McGlone and Harding, 1998).

The discipline of cognitive linguistics concerns itself with the psychological processes which underlie the production of language. Metaphors help people conceive of abstract constructs (e.g. time) in terms of objects that they experience concretely (e.g. space) (Levinson, 2003). Analogies between time and space exist in almost all cultures (Sinha *et al.*, 2011) and are expressed in figurative language, e.g. “time flies,” “we’re heading towards bankruptcy.” These mappings between time and space may be hard-wired in the brain. For instance, people construe time differently when they are moving than standing still (Boroditsky and Ramscar, 2002). Similarly, imagining far distances makes people overestimate durations (Kim, Zauberger, and Bettman, 2012).

The analogies that map time to space are known as temporal frames of reference (Evans, 2013). Speakers can use either a time-moving frame or an ego-moving frame to convey similar content (Gentner *et al.*, 2002), as shown below.

(1) *The end of the financial year is approaching.* [Time-moving frame]

(2) *We're approaching the end of the financial year.* [Ego-moving frame]

In the first sentence, the speaker conceives of time as moving towards him or her. In a time line where the future is depicted to the right of the speaker, the time-moving frame is represented by events moving from right to left (Figure 1). In the second sentence, the speaker (or 'ego') is moving towards a point in time. In a time line, the ego moves from left to right. That the same future event can be described using either frame reinforces the fluidity of temporal frames (Ramscar *et al.*, 2010). Contextual cues lead people to switch frames (Hauser, Carter, and Meier, 2009).

Insert Figure 1 about here

For strategy researchers, the important question is: Do temporal frames of reference influence intertemporal choice? Evidence from linguistics hints that time- and ego-moving frames may be associated with assigning different values to future outcomes. Using field studies, Duffy and colleagues (2014) find that people who interpret information through a time-moving frame show greater conscientiousness and less procrastination than those who interpret the same information through an ego-moving lens. They undertake unpleasant tasks in the present. In contrast, people who apply the ego-moving frame appear later for appointments. They also complete unpleasant tasks close to, or after, deadlines. Relegating unpleasant tasks to the future implies a present time perspective.

Time-moving frames potentially make future events loom larger than do ego-moving frames. When time is perceived as moving ("the future is approaching"), future events are

moved forward into the present. The image of an event approaching suggests that it will strike head on and ought to be taken seriously (Hsee *et al.*, 2014). Future rewards will weigh heavily. In contrast, when the ego is moving through time (“I am approaching the future”), future tasks are simultaneously moved forward into the future (Duffy and Feist, 2014). As Nuñez, Motz, and Teuscher (2006: 135) note, future events stay ahead of the ego in ego-moving frames. “If ... the Ego is conceived as moving “forward” through time, then future events are farther ahead relative to the Ego’s motion” and thus appear distant to the ego. In this way, future events may be less salient (Hsee *et al.*, 2014).

Control beliefs

Managerial agency is important to future-oriented action. Strategy is characterized by decisions whose outcomes can be influenced by managers. Without confidence that their actions will produce the desired results, managers have limited interest to make costly investments with uncertain returns (see Bandura, 2000; Mischel, Shoda, and Rodriguez, 1989). Seemingly, human agency is represented differently in ego- and time-moving frames. The ego-moving frame depicts the person as agentic and actively approaching the future, whereas time is the actor in the time-moving frame (Carver, 2006).

Within strategy research, locus of control is an established construct that relates to the sense of agency (Hodgkinson, 1992). Specifically, locus of control is “the degree to which persons expect that a reinforcement or an outcome of their behavior is contingent on their own behavior or personal characteristics (internal) versus the degree to which persons expect that the reinforcement or outcome is a function of chance, luck, or fate, is under the control of powerful others, or is simply unpredictable (external)” (Rotter 1990: 489).

Control beliefs matter for future-oriented strategies because they influence opportunity evaluation and goal-oriented behavior. An internal locus of control prompts approach (e.g., making an investment in the belief of being able to influence its outcome)

rather than withdrawal (e.g., rejecting an investment with uncertain returns) (Kramer and Yoon, 2007). Decision-makers with an internal locus have confidence to achieve success and readily go after opportunities, whereas an external locus magnifies uncertainty as decision-makers view outcomes as dependent on the external environment. An internal locus predicts long-term decision-making and is associated with overriding impulses for immediate rewards (Lasane and Jones, 1999; Platt and Eisenman, 1968). Actors with an internal locus save more than peers with an external locus (Lunt and Livingstone, 1991).

However, research has not always found a consistent link between locus of control and future-oriented decisions (Plunkett and Buehner, 2007): the precise effect of control beliefs is contingent upon other individual-level and contextual factors. Temporal frames may be one such factor. Individuals using the ego-moving frame report a high sense of agency (Richmond, Wilson and Zinken, 2012). This is understandable because the ego in the ego-moving frame actively approaches the future. Presumably, executives also believe that they convey agency when employing ego-moving language in their reports. Yet, evidence reveals the time-moving frame to be associated with prioritizing action in contrast to the ego-moving frame which moves events forward into the future and causes them to be postponed (Duffy and Feist, 2014). Thus, if strategy scholars are interested in understanding long-termism, examining control beliefs in isolation is insufficient. Rather, it is important to consider both the saliency of future events to the decision-maker and his/her control beliefs in concert. The research program is designed with this goal in mind.

EMPIRICAL ANALYSES

Three studies shed light on how temporal frames of reference are used in practice (Study 1), how they are associated with intertemporal choice (Study 2), and whether any relationship between temporal frames and decision-making is potentially causal (Study 3). Research in linguistics often observes group- and macro-level phenomena qualitatively whereas micro-

level attributes can be readily captured quantitatively (Dörnyei, 2007). I employ an initial qualitative study to inform the subsequent quantitative studies.

STUDY 1. ARCHIVAL STUDY

A strong link exists between discourse and cognition (Doriau, Reger, and Pfarrer, 2007), with executives' conception of time reflected in their discourse (Slawinski and Bansal, 2012). I undertook textual analysis 1) to identify how managers use ego- and time-moving language when describing future intentions, and 2) to establish propositions about how ego- and time-moving forms of language map to ways of construing the future.

Sample and Data

The sample consists of 10 U.S. pharmaceutical companies consistently covered by the rating agency Innovest, part of MSCI ESG Research, from 2002. Additional data are sourced from Thomson Reuters Asset 4 and Thomson Reuters StreetEvents. The pharmaceutical sector is characterized by pressures for short-term performance (e.g. selling existing products and generic drugs) as well as pressures to invest in sources of long-term growth (e.g. research into new drugs). The sector provides “polar types” of cases (Eisenhardt and Graebner, 2007: 27). There are two ideal-type business models: one, as represented by firms such as Eli Lilly, involves research to build a future competitive advantage, and another, as represented by Mylan, involves producing and selling generics to gain a present competitive advantage. As an example of short-term orientation, during the observation period (2002-2011), Mylan raised the prices of some drugs by 2,600% and 3,200% despite long-term consequences for its relationships with stakeholders.

Though temporal orientation cannot be directly observed, it is possible to identify future-oriented behaviors. The Asset4 data base provides financial data, such as research and development spend, as well as data relating to how firms address long-term social issues (Bansal and DesJardine, 2014). Some pharmaceutical firms spend consistently around 15% of

their revenues on R&D and gain high scores for their responses to long-term social issues, whilst others spend 3-10% of their revenues on R&D and gain poor scores for their responses to the same issues.

The StreetEvents data base includes transcribed earnings calls with analysts. These calls are apt for the current research endeavor. First, their aim is to review performance and to look ahead. The calls are used in accounting to identify short- and long-term thinking (Li, 2010). Second, the calls include a prepared section as well as unscripted responses to queries so that the language reflects actual thinking more than corporate reports would. Third, multiple management team members, including the CEO and CFO, participate. The calls help to identify whether team members construe the future in the same way. For each firm and year from 2002 to 2011, I collected the fourth quarter call transcriptions from StreetEvents. Fourth quarter calls were most likely to include content relating to the coming year and further ahead. Transcriptions were unavailable for six firm-year observations, leading to 94 transcriptions in total. Each document comprises on average 10,739 words.

Insert Table 1 about here

Table 1 depicts the firms in descending order of R&D/revenue ratio and also provides their Asset4 social performance score (out of 100). The Asset4 social performance score is a composite index which reflects how well firms respond to long-term issues across seven issues (employment quality, health and safety, training and development, diversity, human rights, community, and product responsibility). High social performance is positively correlated with future orientation (Flammer and Bansal, 2017). To the extent that behavior reveals something about temporal orientation, the topmost firms have the strongest future orientation, and the bottom firms have a stronger present orientation.

Protocol

Two researchers, one of whom was blind to the purpose of the study, independently read the transcriptions, carefully tagging all references to the future. They isolated references that also involved spatial language and noted whether the references involved ego-motion or time-motion. Cohen's kappa was 0.662, indicating substantial inter-rater agreement (Landis and Koch, 1977). This left a total of 674 ego- or time-moving mentions of the future. The same researchers analyzed the tagged sections, identifying how language was used in context. Consistent with the overview, particular (but not exclusive) attention was paid to how executives described the external environment and its controllability. Analysis uncovered two themes: the use of time-moving frames to denote the distant future, and differences in the modality of language (specifically, how some executives used time-moving frames to describe constraints whereas others used similar frames also to describe choices).

Results

The analysis reveals two dimensions that govern the use of ego-moving and time-moving forms of language. First, the ego-moving frame is largely used to express the near future, whereas the time-moving frame is frequently used to express distant events. Second, though the ego-moving frame is mainly used to describe events that are likely or under the firm's control, executives in some firms also use time-moving frames to articulate strategic choice.

Spatial language and the short- versus long-run

Time-moving frames were frequently used to express events in the distant future whereas ego-moving frames were largely used to express the near future.

Building a robust pipeline and transforming our business both to excel in an increasingly challenging health care environment, as well as to *prepare for the patent expirations coming in the next decade*. (Eli Lilly, CEO, 2008, using a time-moving frame)

We'll continue to develop those (supply chain efficiencies) as *the years move along*. We're early in that process. (Johnson & Johnson, CFO, 2011, using a time-moving frame)

Humira (is) a true pipeline... with five additional low-risk high-reward *opportunities coming over the next three to four years*. (Abbott, Pharmaceutical Products Group, 2005, using a time-moving frame)

Our primary focus *in the near future will be to drive our business*. (Mylan, CEO, 2008, using an ego-moving frame)

Once *we get through these short term challenges...* (Hospira, CEO, 2011, using an ego-moving frame)

I followed the approach of Brochet, Loumioti, and Serafeim (2013) to identify whether this pattern was systematic. In the accounting literature, short-term denotes time horizons shorter than a year, and long-term refers to horizons of a year or longer. References to periods below one year (e.g. “month,” “quarter”) were flagged as short-term. Mentions of periods of one year or longer (e.g. “years ahead,” “next decade”) were flagged as long-term. Occasions where frames were used without an explicit horizon (e.g., “We are entering a new phase”) were noted¹. Excluding references of indeterminate duration, 278 references of ego- and time-moving language were explicitly linked to the short-term (less than one year) or long-term (one year or longer). Of these 278 references, 19.23% of the ego-moving, and 38.54% of the time-moving, references were linked to the long term. The greater propensity for time-moving language to be linked to the long-term is significant ($\chi^2 (1) = 12.212, p = 0.000$). Time-moving frames are thus associated with long horizons, that have been shown to characterize future-oriented strategies (Das, 1987; Nadkarni, Chen, and Chen, 2015).

The prevalence of ego-moving and time-moving language differs. Firms with high R&D/sales ratios have a higher incidence of the time-moving frame. In Figure 2, I plot firms by their mean ratio of R&D spend to revenue over the period 2002 to 2011 (scaled to 1 reflecting the highest mean, namely Eli Lilly of 19.73%) and their ratio of time- to ego-moving language (likewise, scaled to 1, which reflects the use of 0.56 times as much time- as

¹ Whereas Brochet *et al.* code “looking forward” as long-term, I code it as of indeterminate length unless it is qualified by a specific period (e.g. “looking forward into 2012,” “looking forward into the next quarter”).

ego-moving language). On balance, executives in firms that invest in R&D in the hope of gaining future benefits use more time-moving language. Merck is an outlier².

Insert Figure 2 about here

On average, CFOs use ego-moving language about 24% more frequently than CEOs. Plausibly, CFOs focus on predicting near-term results, whereas CEOs often refer to longer-term strategies. That said, generally executives from the same firm show similar inclination to use time-moving frames, thus providing some support for the idea of temporal norms within firms. Across the 10 firms, the intraclass correlation between the CEO's ratio of time-moving to ego-moving language and that of his peers is 0.644 ($p = 0.077$), which suggests some convergence across members of the same team (see Cicchetti, 1994).

Thus, time-moving language is comparatively more likely than ego-moving language to describe the long-term. Though the evidence does not show a causal relationship, it is consistent with the assumption of a stronger association between the long-term future and time-moving frames than ego-moving frames. A future event articulated in an ego-moving frame can appear distant. This occurs because future events stay ahead of decision-makers in ego-moving frames (Nuñez *et al.*, 2006). When a future event is depicted as the agent in the time-moving frame, it may be attended to (see Carrasco, Ling, and Read, 2004), making its approach appear faster (Turatto, Vescovi, and Valsecchi, 2007).

Based on this reasoning, I establish the following proposition:

Proposition 1. The use of the ego-moving frame will be associated with a stronger focus on the short-term than the use of the time-moving frame.

Spatial language and modality

² A plausible explanation is that Merck was under the shadow of litigation owing to the cardiovascular risks linked to Vioxx. These risks became public in 2002, and the product was suspended in 2004. Merck made a legal settlement of \$4.85 billion in 2007 and made a subsequent settlement in 2008. The firm's long-standing research focus co-existed with a need to sustain its survival. Facing threats, managers focus attention on immediate issues that can be controlled (see Dutton and Jackson, 1987).

A second finding relates to the modality of time-space analogies. At its most basic, modality represents attitudes towards the world and encompasses certainty, possibility, necessity, and ability. Where time is concerned, modality denotes whether events appear as real, likely, and/or within the speaker's influence (Jaszolt, 2013). Time-moving language is often used to express uncertain events, whereas ego-moving language is more often used to express events over which the firm has influence. In numerous firms, speakers use the ego-moving frame to express commitments and confidence in achieving objectives.

Altima is *off to a strong start* with worldwide sales in 2004. (Eli Lilly, IR manager, 2004)

We're *going down a good path* and pleased with the progress, and I think *we'll continue to move down a good path*. (Pfizer, CFO, 2011)

We will be able to *accelerate the growth going out beyond that*. (Johnson & Johnson, CEO, 2005).

We expect to *move aggressively forward* to meet with the FDA and EMEA to discuss our plans. (Alexion, CEO, 2005).

My commitment to meet the earnings projects is of the utmost importance... Because of that, you can only imagine that *the way I'm approaching Mylan's generic biologics entrance* is obviously going to take that into consideration. (Mylan, CEO, 2008).

In contrast, time-moving language is often linked to uncertainty. Executives frequently use time-moving language to describe events, whose outcomes and timing cannot be controlled. Being confronted by unpredictability is summed up by Perrigo's CEO (2005) who describes "the uncontrollable outside factors that are hitting us this year." Other executives use similar language to express dependence on external circumstances.

We can never predict what circumstances and variables that we as management and the board of directors would have to be faced *with at the time an approval would come*. (Mylan, CEO, 2003)

I don't know I really want to make too many comments specifically on the consumer healthcare quarterly sales guidance... because *we don't know when cough, cold, flu season will hit*. We find it to be turbulent. (Perrigo, CEO, 2009)

This evidence seems to equate time-moving language with an external locus of control and ego-moving language with an internal locus. Yet, particularly in R&D-intensive firms, time-moving frames are also used to express choice and long-term opportunities. The modality of ability is present as executives declare their actions to prepare for eventualities and suggest that uncertainty will be resolved with positive consequences for the firm.

There's going to come a time when... certainly share repurchase is something we'd be considering. (Abbott, 2002)

Building a robust pipeline and transforming our business both to excel in an increasingly challenging health care environment, as well as to *prepare for the patent expirations coming in the next decade.* (CEO, Eli Lilly, 2008)

Further, even when outcomes are in the hands of external parties, they are frequently not depicted in the fatalistic terms as used by the CEOs of Perrigo and Hospira. Notably, when Eli Lilly's Director of Investor Relations mentions "product decision(s) coming up," he is silent on whether the decision is in the hands of the FDA or Eli Lilly itself.

We will be increasing our spending in discovery... We have a number of products potentially going into Phase III with product decisions this year... Those would be Arzoxifene, CS-747, possibly PPAR modulator, it has a product *decision coming up in the next few months*, as well as Endostorin for non-Hodgkins Lymphoma, which also has a *product decision coming up some time this year.* (Eli Lilly, 2003, Director IR)

In sum, whilst executives in firms that prioritize short-term concerns overwhelmingly use time-moving frames to denote uncertainty, executives in other firms use time-moving frames also to represent ability and their influence over the external environment. This finding suggests that time-moving frames do not necessarily imply low control beliefs (cf. Richmond *et al*, 2012). The activity/passivity of the actor (as in Figure 1) may be distinct from conventional understandings in strategy of agency and control.

Even if control beliefs do not map directly to time- and ego-moving language, they are central to strategy. Control beliefs represent a proclivity to action, and an internal locus of control often prompts future-oriented decisions (Lasane and Jones, 1999). Arguably, when combined with a time-moving frame, which makes future events appear salient, perceptions

that the environment is controllable prompt long-term decisions. Notably, any effect of locus of control is likely to be a moderation effect rather than a mediation. Locus of control is considered dispositional (Bono and Judge, 2003)³, and hence invoking an ego- or time-moving frame should not alter the locus of control. Rather, the influence of the frame in provoking future-oriented decisions will depend on the individual's inherent locus of control.

Whereas temporal frames of reference make future events more or less salient to decision-makers, control beliefs are more likely to influence the propensity to act by altering the perceived pay-offs. Thus, an internal locus, typically associated with the positive evaluation of opportunities, is likely to amplify the attractiveness of future-oriented decisions prompted by time-moving frames. Managers with an external locus, i.e. the belief that outcomes depend on chance or external circumstances, may be less inclined to make long-term investments because they err on the side of caution when estimating the returns.

Based on this reasoning, I establish the following proposition.

Proposition 2. Decision-makers' control beliefs moderate the influence of temporal frames in prompting a long-term focus in strategic decisions. An internal locus of control will positively moderate the influence of time-moving temporal frames on strategic decisions.

STUDY 2: FRAMES, LOCUS OF CONTROL, AND INTERTEMPORAL CHOICE

Building on the analysis above, I devise a study to assess the relationship between temporal frames of reference, locus of control, and intertemporal choice. Subsequently, I test the combined influence of temporal frames and control beliefs on intertemporal choice in the context of a strategic decision.

Participants and design

I partnered with Qualtrics Panels to recruit 176 business managers (43.75% females; mean age = 46.30 years, standard deviation = 12.33). All were resident in the USA and were native speakers of English. Qualtrics Panels has access to more targeted subject pools than

³ There is some evidence that control beliefs about *specific* issues – rather than a general sense of control - can be influenced (Mittal and Ross, 1998), and I exploit this in a supplementary study A1 (online material).

conventional laboratory studies (Crilly, Ni, and Jiang, 2016). 46.03% of the managers were CEOs, directors, or senior managers. 80.11% had a university degree, and 23.86% had a postgraduate qualification.

Subjects responded to an online survey. Consistent with prior research (Boroditsky and Ramscar, 2002), to identify frames of reference, subjects first answered the question: “A meeting arranged for next Wednesday has been moved forward two days. What day is the meeting now that it has been rescheduled?” As discussed above, Monday responses reflect a time-moving frame (i.e. the sentence is interpreted to mean that the meeting is moved closer). Friday responses reflect an ego-moving frame (i.e. people perceive themselves as moving forward and interpret the sentence to mean that the meeting date is moved two days further ahead). I created a dummy variable (1 = ego-moving frame, and 0 = time-moving frame).

Subsequently, subjects completed a matching task. The matching task is an established way of measuring intertemporal choice that predicts behavior in the face of trade-offs between short- and long-term returns (Hardisty *et al.*, 2013; Loewenstein *et al.*, 2003). In the task, subjects indicate how much money they would need to receive after 1, 5, 10, and 20 years instead of receiving \$1,000 tomorrow. The points of indifference can be converted into discount rates over the various time intervals. Assessing multiple points of indifference allows for dynamically inconsistent time preferences (Thaler, 1981) because people do not discount the future at a constant rate per unit of time (Souder and Bromiley, 2012). Participants who indicated that they preferred to receive less than \$1,000 in the future were excluded for fear that they had misunderstood the question. 12 participants were in this category, resulting in 164 responses to be analyzed.

To control quality, the survey included attention filters. At intermittent points, people were asked to reproduce random text (Oppenheimer, Meyvis, and Davidenko, 2009).

Subjects' locus of control was measured using Rotter's (1966) scale as well as Hodgkinson's

(1992) strategic locus of control scale. I also collected demographic information (hierarchy in the firm, measured on a 1-4 scale, whereby 1 represented lower management, 2 middle management, 3 higher management, and 4 C-level executive; and education, measured on a 1-4 scale, whereby 1 represented no high school graduation, 2 high school graduation, 3 university degree, and 4 postgraduate degree).

Results

Of the analyzed responses, 90 subjects (54.88%) answered Monday, and 74 (45.12%) answered Friday. In the matching test, there is no upper bound so that mean values can be thrown off kilter by outliers (Frederick *et al.*, 2002; Hardisty *et al.*, 2013). To exclude outlier influence, I winsorized the data at the 97th percentile. The winsorized mean values are shown in Figure 3. After 1 year, Monday (time-moving frame) respondents would need \$2,130.59 in place of \$1,000 today, whereas Friday (ego-moving frame) respondents would need \$3,415.47. This gap rises to \$6,415.76 versus \$10,233.50 after 5 years, equivalent to annual discount rates of 14.68% and 20.53%.

Insert Figure 3 about here

Table 2 displays descriptive statistics and pairwise correlation coefficients.

Insert Table 2 about here

To test whether the differences between the two groups (Monday/time-moving frame, and Friday/ego-moving frame) are significant, I calculated the annual discount rate for each subject over each of four intervals (one, five, 10, and 20 years). I employed seemingly unrelated regression to estimate the association between the frame and discount rates. Seemingly unrelated regression is appropriate because, though I estimate a separate equation for each delay, the error terms may be correlated across the equations (Zellner, 1962). The results are reported in Table 3, showing coefficients, standard errors and p-values. Whilst the

coefficient on Friday responses (the ego-moving frame) is positive across all delays, it is significantly so across the 5-year ($p = 0.035$) and 10-year ($p = 0.039$) delays. A five-year delay corresponds to the long-run planning period of most large corporations (Grant, 2003).

Insert Table 3 about here

In columns IV to VIII, I regress subjects' discount rates on their temporal frames of reference (ego-moving versus time-moving) whilst controlling for individual characteristics. Even controlling for covariates, an ego-moving frame remains a significant predictor of high discounting over the 5- ($p = 0.032$) and 10-year ($p = 0.035$) delays. There is no consistent association between having an internal locus of control and the discount rates applied to future gains. Further, as per Table 2, the correlation between the locus of control and the ego-moving frame is insignificant ($p = 0.732$, using Rotter's scale, and $p = 1.000$ using Hodgkinson's scale).

Overall, then, the ego-moving frame is associated with higher discounting of future returns than the time-moving frame for periods of a medium to long delay. This result is consistent with the idea that the ego-moving frame is linked to prioritizing the present over the future and therefore is consistent with Proposition 1, though it does not provide evidence of a causal relationship. I investigate this relationship further in Study 3.

STUDY 3: FRAMES, LOCUS OF CONTROL, AND DECISION-MAKING

The aims of Study 3 are 1) to assess support via an experiment for the relationship between temporal frames and how people value future returns, and 2) to test the moderating effect of control beliefs (Proposition 2).

Participants and design

I conducted a study on two cohorts of professionals, each involved in a one-week corporate strategy program in London attracting participants primarily from the UK, US, Middle East, and East Asia. Across the two cohorts, 105 participants completed the exercise, a business

strategy scenario decision, in full. Subjects were experienced (average 9.67 years of business experience; s.d. = 4.58), and the most frequent titles were Vice President, Director, and Manager. 44 had a background in industry, and 27 in finance.

Subjects were randomly assigned to two groups. The experimental manipulation followed the scheduling task of Hauser et al. (2009). Subjects in group 1 (ego-moving condition) were presented with the information: “The company moved its annual shareholder meeting forward from March 11 to March 18.” Subjects in group 2 (time-moving condition) were presented with the information: “The company moved its annual shareholder meeting forward from March 18 to March 11.” Subjects in both groups were asked to reschedule identical events, variously described as being moved forwards or backwards, and to list the new dates. The events were unrelated to strategy (e.g., “If the Tokyo Olympic Games, which are scheduled to be held in 2020, are moved forward one year, in which year will they take place?” and “The film *Underdogs* is expected to be released on April 10. If the release date is moved backwards one day, on which day will the film be released?”).

Subjects then read a scenario about a pharmaceutical firm’s potential acquisition of a biotechnology firm (see Table 4), based on the finding of Litov and colleagues (2012) that many acquisitions ultimately increase long-term earnings whilst leading firms to miss their short-term forecasts. They were asked to advise the CEO. The wording used was: “If you advise in favor of the acquisition, the firm will probably miss its short-term earnings forecast even if the acquisition leads to earnings increasing in subsequent years.” Subjects indicated whether they believed the acquisition would create economic value for the acquirer (1 – strongly disagree; 9 – strongly agree). No information on finance restrictions or alternatives was provided. The aim was to understand whether subjects viewed a likely NPV-positive investment as sensible if it had negative short-term consequences rather than have them compare it against explicit alternatives (see Rick and Loewenstein, 2008). Subjects

completed Rotter's (1966) locus of control scale. As a manipulation check at the end of the survey, subjects responded to the question: "A meeting scheduled for next Wednesday has been moved forward two days. On which day will it now take place?"

Insert Table 4 about here

Results

The manipulation check confirmed that respondents in the time-moving condition were more likely to respond Friday than those in the ego-moving condition ($X^2(1) = 12.906$; $p = 0.000$).

The descriptive statistics and pairwise correlations are shown in Table 5 and the results of an ordered logit regression analysis in Table 6. The ordered logit specification takes account of the ordinal nature of the dependent variable. Covariates are included for being a native English speaker and for experience in the pharmaceutical sector or in consultancy because those subjects might better appreciate the long investment cycles typical in the sector⁴. Whilst there is no evidence of a direct effect of time-moving framing on support for the acquisition, there is evidence of a significant ($p = 0.041$) interaction of time-moving framing and the locus of control (Model II). This is a moderation rather than a mediation, as the time-moving framing has no effect on the locus of control (pairwise correlation = 0.126; $p = 0.196$). This provides support for Proposition 2. Specifically, it implies a cross-over interaction: the direction of the effect of the time-moving frame on support for the long-term decision depends on the strength of the locus of control.

Insert Table 5 and Table 6 about here

In Figure 4, I plot the degree of support by treatment (time-moving frame, ego-moving frame) and by locus of control (internal, operationalized as having an internal score

⁴ The results are also robust to including fixed effects for other professional backgrounds (finance, services, and technology) as well as to including no individual-level controls.

on the Rotter scale one or more standard deviations above the mean, and external, operationalized by a score at least one standard deviation below the mean). The odds ratio of the interaction term internal locus x time-moving cue is 1.190, implying that for a one unit increase in the interaction variable (mean: 0.295; standard deviation: 2.116), the odds of showing a high level of support for the long-term investment versus lower levels of support become 19% greater. For an increase of one standard deviation in the interaction variable—approximately equivalent to an increase of four units in Rotter’s 23-level locus of control scale—the odds of showing a high level of support versus lower levels of support become 40.20% greater.

Insert Figure 4 about here

The above estimations of the coefficients and odds ratios rest on the proportional odds assumption, i.e. that coefficients do not vary according to the level of the dependent variable. I check this assumption by performing a likelihood ratio test of the proportionality of odds, where the null hypothesis is that there is no difference in the coefficients across levels. The test obtains a $\chi^2(36)$ value of 39.18 ($p = 0.329$), implying that the proportional odds assumption is not violated. A second test, the Brant test, simultaneously conducts multiple regressions on the dependent variable, each for a different level of the outcome. To conduct this test, I reclassify the dependent variable into quintiles, each with an equivalent number of observations for statistical power considerations (Bartholomew, Knott, and Moustaki, 2011). The Brant test obtains values of $\chi^2(3)$ 4.63 ($p = 0.201$) for the time-moving treatment, 0.84 ($p = 0.893$) for the locus of control, and 0.46 ($p = 0.927$) for the interaction, providing support that the variables do not violate the proportional odds assumption.

Additional analyses

To support the insight that the time-moving frame prompts attention to the future, after completing the previous decision, subjects received the target's earnings forecasts (Year 1 forecast = - \$10 million EBIT, Year 2 forecast = \$0 EBIT, Year 3 forecast = \$10 million EBIT, Year 4 forecast = \$20 million EBIT, and Year 5 forecast = \$40 million EBIT). Subjects indicated the maximum sum they would offer for the target if the acquirer insisted on the deal. 98 subjects provided values. The mean offer of subjects in the time-moving condition was \$394.04 million (s.d. = 817.42). That of subjects in the ego-moving condition was \$215.86 million (s.d. = 170.97). The square root of the amounts was taken to reduce the positive skewness. A two-way ANOVA reveals that the main effect on the sum offered of being in the time-moving condition is significant ($F(2,94) = 4.98, p = 0.028$; partial $\eta^2: 0.050$). There is no effect of having an internal locus of control (operationalized as being above the sample mean on the Rotter scale) ($F(2,94) = 2.32; p = 0.131$; partial $\eta^2: 0.024$) on the amount offered. In other words, whilst the locus of control prompts support for action, it does not directly influence how future rewards are valued in the present. In sum, the temporal frame shapes how future returns are weighed in the present, but taking long-term action also requires a sense of control over achieving the desired returns.

Though the experiment used random assignment, individual-level differences could still be in part responsible for the difference in responses. Might cognitive characteristics explain part of this difference? In one of the two cohorts, subjects' views, in the form of open-ended responses, were collected on the proposed acquisition. Consistent with the cognitive-linguistic lens, I used the Linguistic Inquiry and Word Count (LIWC, Pennebaker *et al.*, 2015) dictionary to code the responses. The LIWC identifies validated categories of words that relate to psychological processes. It measures each category as a proportion of the total number of words in the text, thereby controlling for length. There exist two important meta-categories: analytic thinking and cognitive processing. Analytic thinking denotes

breaking problems down into conceptual categories, and its linguistic markers include conjunctions, prepositions, and articles. Analytic thinking predicts intelligence and low impulsiveness (Pennebaker *et al.*, 2014). Cognitive processing involves the effort to understand appropriate responses to problems, and its linguistic markers include verbs such as ‘think,’ ‘believe,’ and ‘know’ (Pennebaker *et al.*, 2015), which imply deliberation.

Coefficients for analytic thinking and cognitive processing are included in Model III⁵. The coefficient on analytic thinking is positive ($p = 0.001$). This supports an association between analytic thinking and the tendency to override desires for short-term gain. The coefficient on cognitive processing is negative. One plausible explanation is that cognitive processing is high when people lack confidence in their response (Pennebaker *et al.*, 2014), whereby high levels of cognitive processing reflect uncertainty—in which case not opting for the long-term action is the safer course. Importantly, the coefficient on the time-moving frame x internal locus interaction term remains positive ($p = 0.003$).

Finally, though executives cannot easily shape subordinates’ locus of control, framing can influence control beliefs about specific issues. One means is by framing events as opportunities or threats. Opportunities are situations in which “gain is likely and over which one has a fair amount of control” whereas threats are situations in which “loss is likely and over which one has relatively little control” (Dutton and Jackson, 1987: 80). As an extension, I report a supplementary study in Appendix 1. This study assesses how framing influences the reactions of 126 finance professionals, who might make investments or investment recommendations, to descriptions of a firm’s potential investments. The study finds a positive interaction between the time-moving frame and opportunity frame on support for the future-oriented investment ($p = 0.017$). Thus, market participants approve long-term strategies

⁵ There is no discernible relationship between these variables and the treatment. The pairwise correlation between the time-moving treatment and analytic reasoning is 0.144 ($p = 0.303$). That between the time-moving treatment and cognitive processing is -0.071 ($p = 0.614$).

communicated using time-moving language and a frame invoking the firm's control over future outcomes. This finding, consistent with the results of Study 3, also highlights that market actors are subject to similar framing influences as managers and draws attention to the response of financial markets to firms' language use.

DISCUSSION

Strategy is a “longitudinal problem” (Porter, 1991): Maximizing short-term returns can be inconsistent with achieving sustainable competitive advantage, with manager psychology and capital market expectations often producing a suboptimal focus on the short term. This paper proposes that managers make sense of time in terms of the physical realities of motion and space. Temporal frames of reference, i.e. analogies between time and space, offer a novel explanation for temporal reasoning. The findings raise a dilemma for strategy: strategists emphasize agency in their discourse, but decisions focused on the long term are fostered by a fine balance between recognizing the inevitability of the future (time-moving frame) and the capacity to influence future results (control beliefs).

A cognitive-linguistic explanation of intertemporal choice

Much strategy research views devising appropriate incentives as an obvious means to manage the trade-off between the short term and long term despite mixed evidence that stock options with long vesting periods produce investments that are appropriate for long-term returns. Ironically, thanks to developments in behavioral economics, economists have long accepted a less rationalistic view of how decision-makers address this trade-off⁶.

The lens of cognitive linguistics is apt to inform how strategists make decisions about short- and long-term trade-offs. This lens unpacks the psychological processes that underlie language production and meaning. Agentic language is prevalent in strategy discourse about

⁶ For example, between 1980 and 2012 the *American Economic Review* published 68 articles mentioning hyperbolic discounting, often cited as evidence of investor irrationality because it leads to dynamically inconsistent preferences. During the same interval the *Strategic Management Journal* published only one article (Souder and Bromiley, 2012) referring to the same phenomenon.

the future. Yet, the studies suggest that executives weigh long-term returns more heavily when they acknowledge a balance between the inevitable advent of the future (i.e. the time-moving frame) and their capacity to influence future outcomes. Moreover, as discussed below, discourse has consequences: it sways the impressions of internal audiences, such as middle managers, and external audiences, including investors.

The cognitive-linguistic lens advances efforts to ground strategic theory in realistic assumptions about decision-making. Specifically, temporal frames of reference denote that time is perceived *spatially*, underpinning the link between strategic thought and physical processes (Gylfe *et al.*, 2015). Whilst most effects documented in this paper apply to the level of the individual decision-maker, discourse is socially constituted. There are organizational differences in how the future is described (Study 1). Thus, managers' locus of control can have different effects across organizational contexts. When the future is framed as time-moving, perceptions of control over outcomes foster support for long-term strategies. Individual-level constructs, such as temporal orientation, have been considered to be stable (Das and Teng, 2001), with some executives inherently more future-oriented than others. Yet, stable individual characteristics by themselves appear insufficient to explain responses.

Practical implications: Communicating internally and externally

The research speaks directly to executives grappling with making strategy decisions for the long term. Already a rich body of evidence investigates the positive and negative performance implications of focusing on the short or long term. This is not to say that executives ought to attend only to the long term. In any firm there may be good reason for some managers to attend to the distant future whilst others attend to immediate pressures. But, psychological forces and investor expectations can encourage a suboptimal focus on the short term (Reilly, Souder, and Ranucci, 2016). Rather than argue that focusing on the long term is

always sensible, the point of the present paper is to show that creating a focus towards long-term results must take account of how organizations and their managers construe time.

Temporal frames can motivate, or discourage, long-term strategies. An idea raised by Thaler and Sunstein (2008: 3) is that designing organizations involves not only the division of labor and coordination, but that it also involves “choice architecture.” Choice architecture denotes the—often subliminal ways—in which people are guided by the norms, information, rewards, and language of their social context. That many management teams simultaneously employ ego-moving discourse and depict control over external circumstances in their calls with analysts suggests that this way of communicating strategy is common, setting the context for middle-level management. Yet, the consequence could be a focus on the present. Executives shape the context for how their subordinates think about time (Ancona *et al.*, 2001; Mohammed and Nadkarni, 2011). Of course, setting the context does not only involve language: temporal leadership also encompasses practices and artefacts that structure time (e.g. Orlikowski and Yates, 2002) such as time charts. Ego- and time-moving analogies might affect how actors represent time visually. It is of note that many time charts depict time as a horizontal flow (similar to Figure 1, with future events positioned on the right side and arrows denoting progression).

Temporal frames also potentially influence the reactions of external audiences. Firms use analogies to communicate their strategies to different effects (Glaser, Fiss, and Kennedy, 2016). Analysts and investors react negatively to many strategies that depress short-term earnings even if they have the potential to increase long-term earnings (Litov *et al.*, 2012). One explanation for this may be that market actors are subject to similar framing effects as managers. A supplementary study (A1, available in the online supporting material) involves finance professionals as subjects. It suggests that communicating long-term strategies matters for investor perceptions, and that investors are prone to similar framing effects as managers.

They are more supportive of investment proposals communicated using a time-moving and control-enhancing frame. These insights extend understandings of how firms' language affects market sentiment.

Extensions and limitations

The cognitive-linguistic lens lends itself to studying other phenomena by informing how managers construe numerous abstract concepts that are core to strategic thinking. In their work on alliances, Graebner and Eisenhardt (2004) show that the "courtship metaphor" structures how executives approach alliance decisions. Similarly, inappropriate analogies may provide misdirection to corporate decision-making. More investigation of analogies can complement research into decision-making. One extension would be to consider time-related metaphors that do not involve space. Metaphors that equate time to money ("time is money") and scarcity ("time famine") are particularly relevant. There are numerous other intangibles in strategic management, e.g. capabilities, reputation, and competition. Resources are often illustrated by the bathtub metaphor, whereby the level represents the accumulated stock and the flow of water represents resource flows. Such analogies could be studied through the same lens with the aim of understanding how they influence decision-making and action.

Language has potential implications at the macro level too. Time- and ego-moving frames exist across languages, but the prevalence of either differs, as do other ways of articulating time (Furman and Boroditsky, 2010). Though the relationship between national languages and behavior is hotly contested, cross-linguistic differences may matter subtly for perception and decision-making (Brandenburger and Vinokurova, 2012). In light of the accusation that firms from English-speaking countries are excessively focused on the short term, a valuable follow-up study would be to investigate cross-language variation in temporal metaphors with the aim of identifying implications for corporate behavior across countries.

There are boundary conditions to the present findings. Though research in linguistics has examined temporal frames both as an individual characteristic and as an effect that can be primed, the time construal primed in the experiments could differ from an individual's more stable inherent usage of either frame in the absence of priming. This speaks to a common problem that primes that are effective in controlled settings may be difficult to replicate in the field (Doyen *et al.*, 2012). More generally, as strategy research draws increasingly on behavioral experiments, issues of designing and analyzing experiments are becoming more important. Given the centrality of trade-offs to strategy, discrete choice experiments can complement the studies in this paper. When decision-makers consider a long-term investment, they do not always explicitly compare it to a range of alternative investments (Rick and Loewenstein, 2008). But, financing constraints are real, and discrete choice experimental designs hold the promise to uncover the drivers of strategic decisions as well as the reactions of firms' stakeholders under such constraints (Auger and Devinney, 2007).

This paper ultimately concerns "executive judgment," which is crucial "in the actual conditions of high-stakes, complex problem solving in organizations" (Powell *et al.*, 2011: 1377). Yet, not all organizational action is explained by the judgments of influential decision-makers. One mechanism, that can account for similar rates of time-moving language across executives of the same firm, is convergence of language. Language often converges towards the style of powerful superiors (Giles, Coupland, and Coupland, 1991). Convergence is consistent with the pattern observed in Study 1, whereby team members often frame future events in the same way as the CEO. An alternative explanation is that managers who construe the future in different ways self-select into roles and firms. Longitudinal field studies offer one way to assess more fully how management teams construct the future.

Relatedly, advancing behavioral work in strategy may benefit from ways of analyzing data, including experimental data, other than through classical techniques. One particular

approach is Bayesian analysis. Bayesian methods are valuable to strategy because they can generate individual decision models as well as aggregate models (Wilden, Devinney, and Dowling, 2016), offering one way to explain the orientations of individual executives as well as organizational action. In a supplementary study (A2, online), I analyze the data using a Bayesian approach. I also encourage scholars to triangulate the findings using other methods. Field studies that track temporal frames and investments over time would be complementary, as would—at the micro level—neuroscientific studies that, whilst not yet common in strategy (Laureiro-Martinez, Brusoni, Canessa, and Zollo, 2015), have been used to investigate intertemporal choice (Peer *et al.*, 2015) and the links between spatial and temporal reasoning (Cooper *et al.*, 2014).

A final question worth addressing is: Where do temporal frames come from? Some events may be more readily represented using one type of frame (Margolies and Crawford, 2008). In a follow-up study (study A3 in the online supplementary material), I assess whether the properties of events—for instance, whether the event is distant in time; whether the event is largely controllable—influence the temporal frame that managers employ. I find only limited evidence of this. The fact that frames are not determined by event characteristics allows for heterogeneity across individuals and firms (as Studies 1 and 2 imply).

Conclusions

Analogies between time and space feature prominently in organizational discourse as they help executives conceive of time in terms of objects that they experience more concretely. Two core ways of mapping time to space (ego-moving versus time-moving frames) are associated with distinct ways of construing the future. Time-moving frames make the future appear more proximate and, in interaction with control beliefs, underpin support from managers and investors for decisions that privilege long-term returns over short-term returns.

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REFERENCES

- Ancona DG, Goodman PS, Lawrence BS, Tushman MJ 2001. Time: A new research lens. *Academy of Management Review* **26**(4): 645-663.
- Auger P, Devinney TM. 2007. Does what consumers say matter? The misalignment of preferences with unconstrained ethical intentions. *Journal of Business Ethics* **76**(4): 361-383.
- Bandura A. 2000. Cultivate self-efficacy for personal and organizational effectiveness. In Locke EA (ed.), *Blackwell Handbook of Principles of Organizational Behavior*. Oxford, UK: Blackwell, pp. 120-136.
- Bansal P, DesJardine M. 2014. Business sustainability: It's about time. *Strategic Organization* **12**: 70-78.
- Bartholomew D, Knott M, Moustaki. 2011. *Latent Variable Models and Factor Analysis: A Unified Approach*. London, UK: Wiley.
- Bluedorn AC. 2002. *The Human Organization of Time*. Stanford, CA: Stanford University Press.
- Bono JE, Judge TA. 2003. Core self-evaluations: A review of the trait and its role in job satisfaction and job performance. *European Journal of Personality* **17**: 5-18.
- Boroditsky L. 2001. Does language shape thought? Mandarin and English speakers' conceptions of time. *Cognitive Psychology* **43**: 1-22.
- Boroditsky L, Ramscar M. 2002. The roles of body and mind in abstract thought. *Psychological Science* **13**: 185-189.
- Brandenburger A, Vinokurova N. 2012. Comment on "toward a behavioral theory of strategy." *Organization Science* **23**: 286-287.
- Brochet F, Loumiotis M, Serafeim G. 2013. *Short-termism, investor clientele, and firm performance*. HBS working paper.
- Carrasco M., Ling S., Read. S. 2004. Attention alters appearance. *Nature Neuroscience* **7**: 308-313.
- Carver CS. 2006. Approach, avoidance, and the self-regulation of affect and action. *Motivation and Emotion* **30**: 105-110.
- Cicchetti DV. 1994. Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment* **6**(4): 284-290.
- Coles JL, Daniel ND, Naveen L. 2006. Managerial incentives and risk taking. *Journal of Financial Economics* **79**(2): 431-468.
- Cooper NS, Kable JW, Kim K, Zauberman G. 2014. Brain activity in valuation regions while thinking about the future predicts individual discount rates. *Journal of Neuroscience*, in press.
- Cornelissen JP, Durand R. 2014. Moving forward: Developing contributions in management studies. *Journal of Management Studies* **51**(6): 995-1022.
- Das TK. 1987. Strategic planning and individual temporal orientation. *Strategic Management Journal* **8**: 203-209.
- Das TK, Teng BS. 2001. Strategic risk behaviour and its temporalities: Between risk propensity and decision context. *Journal of Management Studies* **38**: 515-534.
- Dörnyei Z. 2007. *Research Methods in Applied Linguistics: Quantitative, Qualitative, and Mixed Methodologies*. Oxford, UK: Oxford University Press.

- Doyen S, Klein O, Pichon C-L, Cleeremans A. 2012. Behavioral priming: It's all in the mind, but whose mind? *PLoSOne* **7**: e29081.
- Duffy SE, Feist MI. 2014. Individual differences in the interpretation of ambiguous statements about time. *Cognitive Linguistics* **25**(1): 29-54.
- Duffy SE, Feist MI, McCarthy S. 2014. Moving through time: The role of personality in three real life contexts. *Cognitive Science* **38**(8): 1662-1674.
- Duriau VJ, Reger RK, Pfarrer MD. 2007. A content analysis of the content analysis literature in organization studies: Research themes, data sources, and methodological refinements. *Organizational Research Methods* **10**(1): 5-34.
- Dutton J, Jackson S. 1987. Categorizing strategic issues: Links to organizational action. *Academy of Management Review* **12**: 76-90.
- Eisenhardt KM, Graebner ME 2007. Theory building from cases: Opportunities and challenges. *Academy of Management Journal* **50**(1): 25-32.
- Evans V. 2013. *Language and Time. A Cognitive Linguistics Approach*. Cambridge University Press.
- Financial Crisis Inquiry Commission. 2011. *The Financial Crisis Inquiry Report*. New York: FCIC.
- Flammer C, Bansal P. 2017. Does long-term orientation create value? Evidence from a regression discontinuity. *Strategic Management Journal*, in press.
- Frederick S, Loewenstein G, O'Donoghue T. 2002. Time discounting and time preference: A critical review. *Journal of Economic Literature* **XL**: 351-401.
- Gavetti G, Levinthal DA, Rivkin JW. 2005. Strategy making in novel and complex worlds: The power of analogy. *Strategic Management Journal* **26**: 691-712.
- Gentner D, Imai M, Boroditsky L. 2002. As time goes by: Evidence for two systems in processing space – time metaphors. *Language and Cognitive Processes* **17**(5): 537-565.
- Giles H, Coupland J, Coupland N. 1991. *Contexts of Accommodation*. New York, NY: Cambridge University Press.
- Glaser VL, Fiss PC, Kennedy MT. 2016. Making snowflakes like stocks: Stretching, bending, and positioning to make financial markets analogies work in online advertising. *Organization Science*, in press.
- Graebner ME, Eisenhardt KM. 2004. The seller's side of the story: Acquisition as courtship and governance as syndicate in entrepreneurial firms. *Administrative Science Quarterly* **49**: 366-403.
- Grant RM. 2003. Strategic planning in a turbulent environment: Evidence from the oil majors. *Strategic Management Journal* **24**: 491-517.
- Gylfe P, Franck H, Lebaron C, Mantere S. 2015. Video methods in strategy research: Focusing on embodied cognition. *Strategic Management Journal* **37**: 133-148.
- Hardisty DJ, Thompson KF, Krantz DH, Weber EU. 2013. How to measure time preferences: An experimental comparison of three methods. *Judgment and Decision Making* **8**(3): 236-249.
- Harrington D, Haaland K, Knight R. 1998. Cortical networks underlying mechanisms of time perception. *Journal of Neuroscience* **18**: 1085-1095.
- Hauser DJ, Carter MS, Meier BP. 2009. Mellow Monday and furious Friday: The approach-related link between anger and time representation. *Cognition and Emotion* **23**: 1166-1180.
- Hodgkinson GP. 1992. Development and validation of the strategic locus of control scale. *Strategic Management Journal* **13**(4): 311-317.
- Hsee CK, Tu Y, Lu ZY, Ruan B. 2014. Approach aversion: Negative hedonic reactions toward approaching stimuli. *Journal of Personality and Social Psychology*, **106**(5): 699-712.

- Jaszczolt KM. 2013. Temporality and epistemic commitment: An unresolved question. In K. Jaszczolt & L. de Saussure (eds). *Time: Language, Cognition, and Reality*. Oxford: Oxford University Press, pp. 193-209.
- Kaplan S, Orlikowski WJ. 2013. Temporal work in strategy making. *Organization Science*. **24**(4): 965-995.
- Kim BK, Zauberger G, Bettman J. 2012. Space, time, and intertemporal preferences. *Journal of Consumer Research* **39**: 867-880.
- Kramer T, Yoon S-O. 2007. Approach-avoidance motivation and use of affect as information. *Journal of Consumer Psychology* **17**(2): 128-138.
- Lafley AG. 2014. Letter to shareholders. In Proctor & Gamble 2014 Annual Report.
- Lakoff G. 1987. *Women, fire, and dangerous things*. Chicago, IL: University of Chicago Press.
- Lakoff G, Johnson M. 1980. *Metaphors We Live By*. Chicago, IL: University of Chicago Press.
- Landis JR, Koch GG. 1977. The measurement of observer agreement for categorical data. *Biometrics* **33**: 159-174.
- Lasane TP, Jones JM. 1999. Temporal orientation and academic goal setting: the mediating properties of a motivational self. *Journal of Social Behavior and Personality* **14** (1), 31.
- Laureiro-Martinez D, Brusoni S, Canessa N, Zollo M. 2015. Understanding the exploration-exploitation dilemma: An fMRI study of attention control and decision-making. *Strategic Management Journal* **36**(3): 319-338.
- Levinson, S.C. 2003. *Space in Language and Cognition*. Cambridge University Press.
- Lewin K. 1935. *A Dynamic Theory of Personality*. New York: McGraw Hill.
- Li F. 2010. Textual analysis of corporate disclosures: A survey of the literature. *Journal of Accounting Literature* **29**: 143-165.
- Litov L, Moreton P, Zenger T. 2012. Corporate strategy, analyst coverage, and the uniqueness paradox. *Management Science* **58**(10): 1797-1815.
- Lunt PK, Livingstone S. 1991. Psychological, social, and economic determinants of savings: Comparing recurrent and total savings. *Journal of Economic Psychology* **12**: 621-641.
- Margolies SO, Crawford LE. 2008. Event valence and spatial metaphors of time. *Cognition and Emotion* **22**(7): 1401-1414.
- McGlone M, Harding J. 1998. Back (or forward?) to the future: The role of perspective in temporal language comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition* **24**:1211-1223.
- Mischel W, Shoda Y, Rodriguez ML. 1989. Delay of gratification in children. *Science* **244**: 933-938.
- Mittal V, Ross WT. 1998. The impact of positive and negative affect and issue framing on issue interpretation and risk taking. *Organizational Behavior and Human Decision Processes* **76**(3): 298-324.
- Mohammed S, Nadkarni S. 2011. Temporal diversity and team performance: The moderating role of temporal leadership. *Academy of Management Journal* **54**(3): 489-508.
- Nadkarni S, Chen T, Chen J. 2015. The clock is ticking! Executive temporal depth, industry velocity, and competitive aggressiveness. *Strategic Management Journal*, in press.
- Nunez RE, Motz BA, Teuscher U. 2006. Time after time: The psychological reality of the ego- and time-reference-point distinction in metaphorical construals of time. *Metaphor and Symbol* **21**(3): 133-146.
- Oppenheimer DM, Meyvis T, Davidenko T. 2009. Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology* **45**: 867-872.

- Orlikowski WJ, Yates J. 2002. It's about time: Temporal structuring in organizations. *Organization Science* **13**: 684-700.
- Peer M, Salomon R, Goldberg I, Blanke O, Arzy S. 2015. Brain system for mental orientation in space, time, and person. *Proceedings of the National Academy of Sciences of the United States of America*, **112**(35): 11072-11077.
- Pennebaker JW, Booth RJ, Boyd RL, Francis ME. 2015. Linguistic Inquiry and Word Count: LIWC 2015: A computer-based text analysis program. Austin, TX: LIWC.net.
- Pennebaker JW, Chung CK, Frazee J, Lavergne GM, Beaver DI. 2014. When small words foretell academic success: The case of college admissions essays. *PLOSOne* 9(12): e115844. doi:10.1371/journal.pone.0115844
- Platt JJ, Eisenman R. 1968. Internal-external control of reinforcement, time perspective, adjustment, and anxiety. *Journal of General Psychology* **79**: 121-128.
- Plunkett HR, Buehner MJ. 2007. The relation of general and specific locus of control to intertemporal monetary choice. *Personality and Individual Differences* **42**: 1233-1242.
- Porter ME. 1991. Towards a dynamic theory of strategy. *Strategic Management Journal* **12**: 95-117.
- Powell TC, Lovallo D, Fox CR. 2011. Behavioral strategy. *Strategic Management Journal* **32**(13): 1369-1386.
- Ramscar M, Matlock T, Dye M. 2010. Running down the clock: The role of expectation in our understanding of time and motion. *Language and Cognitive Processes* 25(5): 589-615.
- Read IC. 2014. Letter to shareholders. Pfizer annual review 2013.
- Reilly G, Souder D, Ranucci R. 2016. Time horizon of investments in the resource allocation process: Review and framework for next steps. *Journal of Management* in press.
- Richmond J, Wilson JC, Zinken J. 2012. A feeling for the future: How does agency in time metaphors relate to feelings? *European Journal of Social Psychology* **42**(7): 813-823.
- Rick S, Loewenstein G. 2008. Intangibility in intertemporal choice. *Philosophical Transactions of the Royal Society B* **363**: 3813-3824.
- Rotter JB. 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied* **80**(1):2-28.
- Rotter JB. 1990. Internal versus external control of reinforcement. A case history of a variable. *American Psychologist* **45**(4): 489-493.
- Sinha C, da Silva Sinha V, Zinken J, Sampaio, W. 2011. When time is not space: The social and linguistic construction of time intervals and temporal event relations in an Amazonian culture. *Language and Cognition* **3**: 137-169.
- Slawinski N, Bansal P. 2012. A matter of time: The temporal perspectives of organizational responses to climate change. *Organization Studies* **33**: 1537-1563.
- Souder D, Bromiley P. 2012. Explaining temporal orientation: Evidence from the durability of firms' capital investments. *Strategic Management Journal* **33**: 550-569.
- Thaler RH. 1981. Some empirical evidence on dynamic inconsistency. *Economic Letters* **8**: 201-207.
- Thaler RH, Sunstein CR. 2008. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. Yale University Press: New Haven, CT.
- Turatto M, Vescovi M, Valsecchi M. 2007. Attention makes moving objects be perceived to move faster. *Vision Research* **47**(2): 166-178.
- Wang T, Bansal P. 2012. Social responsibility in new ventures: Profiting from a long-term orientation. *Strategic Management Journal* **33**(10): 1135-1153.
- Wilden R, Devinney TM, Dowling GR. 2016. The architecture of dynamic capability research: Identifying the building blocks of a configurational approach. *Academy of Management Annals* **10**(1) 997-1076.

Wong EM, Ormiston ME, Tetlock PE. 2011. The effects of top management team integrative complexity and decentralized decision-making on corporate social performance. *Academy of Management Journal* **54**(6): 1207-1228.

Zellner A. 1962. An efficient method of estimating seemingly unrelated regression equations and tests for aggregation bias. *Journal of the American Statistical Association* **57**: 348-368.

Figure 1. Depictions of time- and ego-moving frames of references

Time-moving temporal frame of reference

For example, “If there ever comes a day when you and I disagree about the future direction of the company...” (Facebook’s letter to shareholders at its IPO)



Ego-moving temporal frame of reference

For example, “We’ve been driving toward this future for some time.” (AT&T 2013 annual report)



Figure 2. Sample firms’ ratio of time- to ego-moving language plotted against their R&D ratio over the observation period 2002-2011

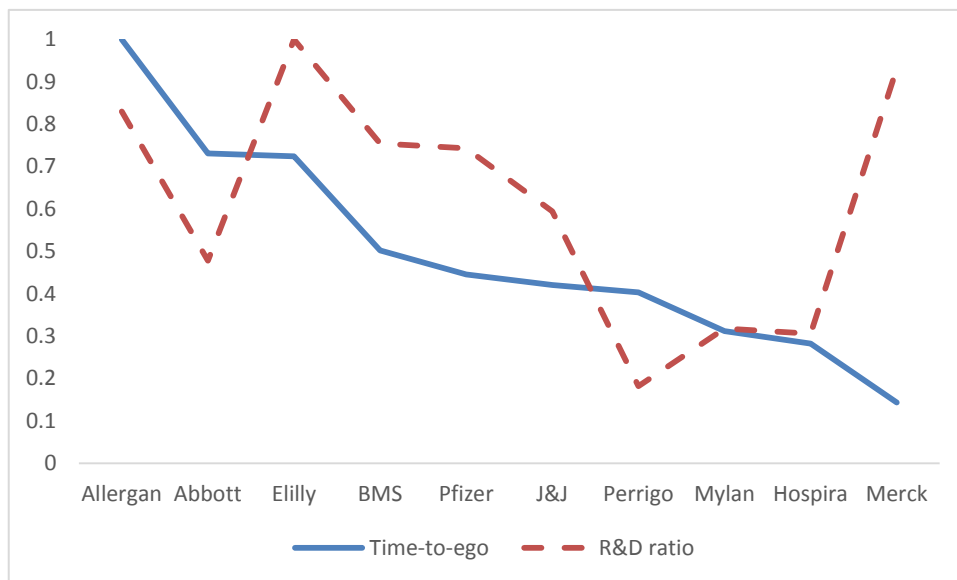
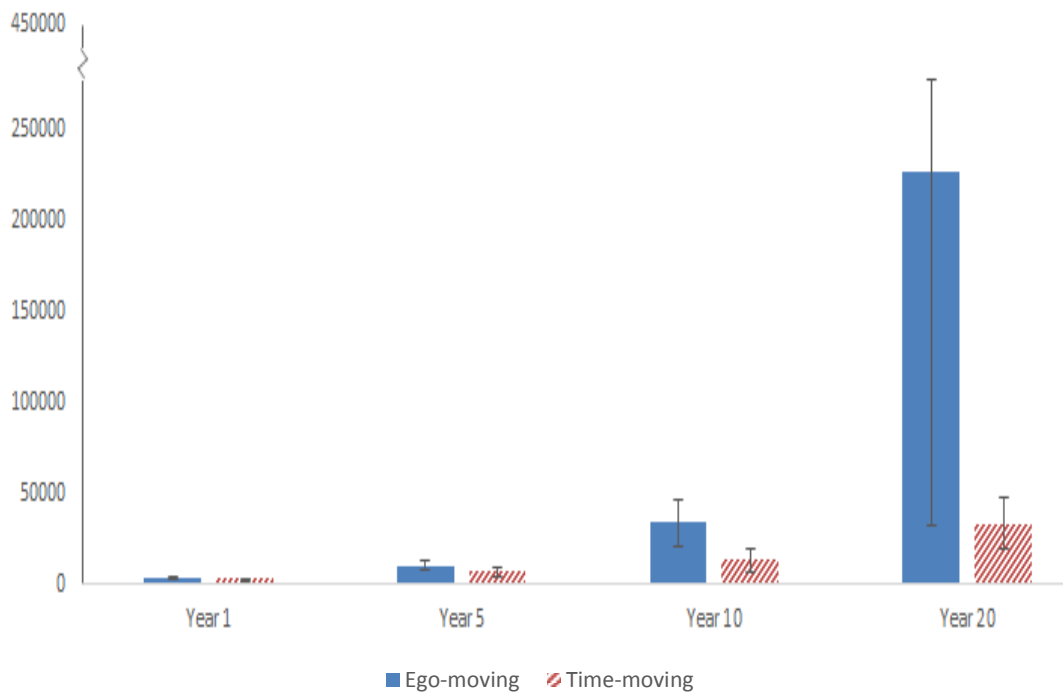


Figure 3. Study 2: Indifference amounts (\$) after 1, 5, 10, and 20 years



Error bars show standard errors of the means.

Figure 4. Study 3: Interaction of temporal frame of reference and locus of control in predicting support for acquisition with negative consequences for short-term earnings

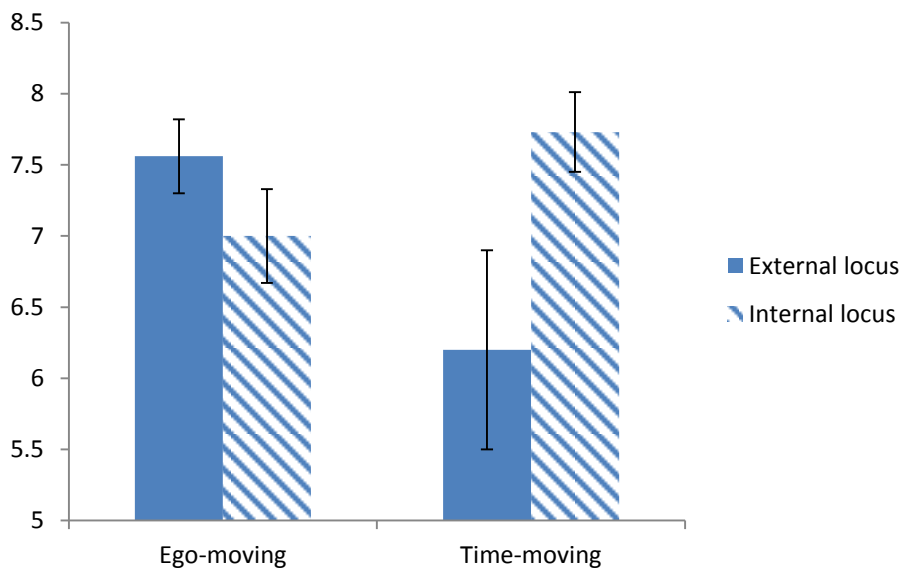


Table 1. Sample firms

Firm	Business	R&D expenditure to sales ratio (2002 to 2011)	Asset4 social score (average, 2002-2011)	Ratio of time-to ego-moving language	Dominant modality in time-moving language
Eli Lilly	Research-intensive pharmaceuticals	19.82%	90.90	0.38	Ability: "These demonstrate our focus on addressing our upcoming patent expiration through innovation." (IR executive, 2010)
Merck	Research-intensive pharmaceuticals	18.45%	92.79	0.08	Uncertainty: "We are withdrawing the guidance. We have not put new guidance in because there are some important events coming up." (CEO, 2010)
Allergan	Research-intensive pharmaceuticals	16.45%	39.64	0.57	Ability: "Every week and month that goes by, there is upside versus our plans." (CEO, 2002)
Bristol-Myers Squibb	Research-intensive pharmaceuticals	14.96%	93.27	0.26	Ability: "This is a very good moment... I'm confident that we'll also continue to see it in the years to come." (CSO, 2006)
Pfizer	Research-intensive pharmaceuticals	14.73%	76.42	0.23	Ability: "As (smoking) bans come into place, it creates a lot more marketplace for us." (President Worldwide, 2008)
Johnson & Johnson	Diversified business with devices and consumer products divisions	11.78%	94.86	0.22	Ability: "We are actively participating in the dialogues on public policy that will shape our business environment for years to come." (Chairman, 2008)
Abbott	Pharmaceutical business with devices and generics divisions	9.47%	88.92	0.73	Uncertainty: "I want to see a quarter or two play out and see how all of this flows." (CEO, 2003)
Mylan	Pharmaceutical business specializing in generics	6.30%	22.75	0.16	Uncertainty: "We can never predict what circumstances and variables that we as management and the board of directors would have to be faced with at the time an approval would come." (CEO, 2003)
Hospira	Pharmaceutical business specializing in generics and devices	6.07%	69.42	0.15	Uncertainty: "That approval will come this year or next year." (COO, 2006)
Perrigo	Pharmaceutical business specializing in generics	3.61%	23.72	0.21	Uncertainty: "I'm not sure what the future will bring." (President, 2004)

During the period of observation (2002-2011), Hospira was an independent company. It was acquired by Pfizer in 2015.

Table 2. Study 1: Correlation table.

	Mean	SD	Ego-moving frame	Year 1 discount	Year 5 discount	Year 10 discount	Year 20 discount	Internal locus	Strategic locus	Hierarchy
Ego-moving frame	0.453	0.499	.							
Year 1 discount	1.811	7.05	0.078	.						
			0.327							
Year 5 discount	0.266	0.341	0.165	0.720	.					
			0.037	0.000						
Year 10 discount	0.173	0.181	0.161	0.591	0.946	.				
			0.042	0.000	0.000					
Year 20 discount	0.106	0.098	0.105	0.480	0.818	0.925	.			
			0.188	0.000	0.000	0.000				
Internal locus	13.572	4.271	-0.027	0.018	-0.089	-0.102	-0.079	.		
			0.732	0.822	0.266	0.201	0.324			
Strategic locus	38.094	7.155	0.000	-0.031	-0.062	-0.073	-0.082	-0.470	.	
			1.000	0.702	0.442	0.363	0.306	0.000		
Hierarchy	2.478	1.036	-0.117	-0.017	-0.071	-0.079	-0.111	0.084	-0.088	.
			0.141	0.830	0.371	0.322	0.163	0.295	0.270	
Education	2.038	0.674	-0.032	-0.101	-0.105	-0.092	-0.060	-0.032	-0.022	0.219
			0.686	0.207	0.187	0.247	0.451	0.691	0.786	0.006

P-values are shown below the correlation coefficients.

Table 3. Study 1: SUR regression predicting discount rates

	I. Yr 1 discount	II. Yr 5 discount	III. Yr 10 discount	IV. Yr 20 discount	V. Yr 1 discount	VI. Yr 5 discount	VII. Yr 10 discount	VIII. Yr 20 discount
Time-moving	1.104 (1.116) p = 0.322	0.112 (0.053) p = 0.035	0.058 (0.028) p = 0.039	0.021 (0.191) p = 0.183	1.079 (1.121) p = 0.336	0.115 (0.054) p = 0.032	0.060 (0.028) p = 0.035	0.023 (0.011) p = 0.309
Internal locus					0.029 (0.131) p = 0.824	-0.007 (0.006) p = 0.295	-0.004 (0.003) p = 0.230	-0.002 (0.002) p = 0.391
Hierarchical position					-0.44 (0.556) p = 0.936	-0.021 (0.026) p = 0.268	-0.013 (0.014) p = 0.0354	-0.011 (0.008) p = 0.168
Education					-1.007 (0.846) p = 0.234	-0.045 (0.040) p = 0.268	-0.020 (0.021) p = 0.355	-0.005 (0.002) p = 0.669
Constant	1.311 (0.751) p = 0.081	0.215 (0.036) p = 0.000	0.215 (0.036) p = 0.000	0.097 (0.010) p = 0.000	4.097 (3.265) p = 0.209	0.491 (0.155) p = 0.002	0.292 (0.082) p = 0.000	0.158 (0.045) p = 0.000
X2	0.98	4.46	4.25	1.77	2.60	8.17	8.16	5.23
R squared	0.006	0.034	0.036	0.017	0.016	0.049	0.049	0.032

When Hodgkinson's (1992) measure of strategic locus of control is used instead of Rotter's (1966) locus of control scale, the coefficient on the time-moving frame remains significant over the five- (p = 0.028) and 10-year (p = 0.030) delays.

Table 4. Decision scenario

Text for study 3
<p>A pharmaceutical corporation has the chance to acquire a smaller biotechnology company. The biotechnology company is developing a treatment for Parkinson’s disease, having already gained relevant compound patents. Parkinson's disease is a neurodegenerative disease, for which there is no cure or therapy yet available. Assume that the proposed price of the acquisition is in line with other acquisitions in the pharmaceutical sector.</p> <p>This acquisition will be disruptive for the company as a whole. The launch of any drug for Parkinson's disease is at least one or two years away. As a result, if you advise in favor of the acquisition, the firm will probably miss its short-term earnings forecast even if the acquisition leads to earnings increasing in subsequent years.</p>

Table 5. Study 3: Correlation Table

	Mean	S.D.	<i>Support</i>	<i>Internal locus</i>	<i>Time moving condition</i>	<i>English speaker</i>	<i>Pharma experience</i>	<i>Consulting experience</i>	<i>Analytic thinking</i>
Support for decision	6.879	1.697							
Internal locus	13.112	4.05	0.171 0.079						
Time moving condition	0.486	0.502	-0.030 0.762	0.126 0.196					
English speaker	0.438	0.499	0.046 0.640	-0.243 0.013	0.081 0.414				
Pharma experience	0.028	0.166	-0.155 0.113	0.066 0.503	-0.165 0.089	-0.036 0.714			
Consulting experience	0.112	0.317	0.131 0.180	0.020 0.842	-0.227 0.019	-0.076 0.442	0.119 0.222		
Analytic thinking	75.012	28.597	0.373 0.006	-0.051 0.716	0.144 0.303	0.066 0.637	-0.031 0.824	0.088 0.532	
Cognitive processes	12.561	7.118	-0.360 0.008	-0.070 0.617	-0.071 0.614	0.269 0.051	-0.144 0.304	-0.122 0.384	-0.153 0.276

P-values are shown below the correlation coefficients.

Table 6. Study 3: Results (ordered logit regression)

VARIABLES	DV: Support for Investment		
	I	II	III
Time-moving condition	0.306 (0.374) p = 0.412	0.222 (0.374) p = 0.554	-0.516 (0.613) p = 0.400
Locus of control	0.069 (0.046) p = 0.137	0.075 (0.046) p = 0.103	0.084 (0.063) p = 0.179
Time-moving condition * locus of control		0.174 (0.085) p = 0.041	0.402 (0.135) p = 0.003
Analytic thinking			0.037 (0.012) p = 0.001
Cognitive processes			-0.153 (0.045) p = 0.001
Native English speaker	-0.718 (0.373) p = 0.054	-0.814 (0.377) p = 0.031	-0.808 (0.595) p = 0.174
Pharma experience	0.762 (1.23) p = 0.535	0.782 (1.192) p = 0.511	-0.238 (1.160) p = 0.837
Consulting experience	0.697 (0.569) p = 0.221	0.852 (0.576) p = 0.139	0.105 (1.014) p = 0.917
Observations	105	105	53
Pseudo R-squared	0.027	0.039	0.192
LR χ^2	9.81	14.00	30.89

Standard errors in parentheses

SUPPLEMENTARY STUDY A1

TIME FRAMES AND CONTROL BELIEFS IN CORPORATE COMMUNICATION

Though executives cannot easily shape their subordinates' locus of control as this tends to be stable, framing can influence control beliefs about specific issues. As an extension, I assess how different framings influenced the inclination to engage in long-term investments. In doing so, I seek to identify how finance professionals, i.e. those who might make investments or investment recommendations, respond to distinct descriptions of a firm's potential investments. One reason for doing so is that the trade-off between maximizing short- and long-term earnings is intensified by investors' negative reactions to firms' announcements of long-term strategies that depress short-term earnings (Litov et al, 2012).

The future is commonly framed as an opportunity or threat, whereby the same event can be construed in either way. Perceived control is core to the distinction between opportunities and threats (George *et al.*, 2006). Specifically, opportunities are situations in which "gain is likely and over which one has a fair amount of control" whereas threats are situations in which "loss is likely and over which one has relatively little control" (Dutton and Jackson, 1987: 80). Similar to control beliefs, the positive attributes of situations framed as opportunities prompt approach (Dantzig, Zeelenberg, and Pecher, 2009). Likewise, just as an external locus of control can prompt avoidance (Kramer and Yoon, 2007), low perceived control over the outcomes of threats provokes timid actions (Dutton and Jackson, 1987). Though the distinction between gains and losses in opportunity-threat framing is also associated with prospect theory, prospect theory is less relevant to evaluating returns from future projects insofar as people seek to eliminate uncertainty in both gains and losses (Hardisty and Pfeffer, 2016).

Participants and design

Partnering with Survey Sampling International and Qualtrics Panels, I recruited 126 finance professionals (mean age = 36.15 years; standard deviation = 10.91): analysts, bankers, corporate finance managers, and insurance professionals. I used two partners on account of the specialist population targeted. Similar to Qualtrics Panels, Survey Sampling International has access to specialist subject pools (Apfelbaum, Stephens, and Reagans, 2016). Subjects were working in the USA (114) or the UK (12). 70.63% of the managers had a university degree. 23.81% had a postgraduate qualification. 95.24% were native English speakers.

I designed a 2x2 factorial experiment. Subjects responded to a survey administered online with appropriate attention checks (Oppenheimer *et al.*, 2009). Subjects were informed that a pharmaceutical firm's best-selling drug was coming off patent, and that the company faced the choice between 1) investing more in research to develop new drugs, and 2) licensing drugs from other firms to resell. The intertemporal trade-off inherent in investing in research and development was made clear: whilst research and development might increase future earnings, the increase in expenditure by a magnitude of 40% per annum would mean that no dividends would be paid in the subsequent two years. This trade-off is symptomatic of value-creating strategies that depress short-term earnings.

Subjects were randomly assigned between two conditions. The first treatment was the temporal frame of reference. In the time-moving condition, subjects were informed that the date of the patent expiration was approaching. In the ego-moving condition, respondents were informed that the firm was approaching the date of the patent expiration. Interpreting time- and ego-moving language involves mental simulation of motion (Gallese and Lakoff, 2005). I expected, and found in pilot tests, that reading such a prompt would foster a time- or ego-moving frame. The second treatment was the opportunity-threat framing. In the opportunity condition, the expiration of the patent was described as an opportunity because the firm had a successful record of drug development (i.e. consistent with Dutton and Jackson's (1987)

definition of opportunity as being about both gains and control). In the threat condition, the expiration of the patent was described as a challenge because the firm would have to try to minimize loss and there was no guarantee that drug development would be successful (i.e. consistent with Dutton and Jackson's definition of threat as being about both losses and limited control)⁷.

Subjects indicated on a 1-7 Likert scale the degree to which they believed that investing in developing new drugs made sense for the firm in the future. I collected demographic information, including subjects' locus of control using Rotter's (1966) scale. In this study the locus of control is used as a control variable. The central interest lies in the influence of opportunity framing, which can affect how investors perceive the ability of the focal firm's managers to achieve expected earnings but is not expected to affect investors' personal control perceptions. Subjects explained in open-ended text their reasons for supporting, or not supporting, the investment in developing new drugs as opposed to the cheaper alternative of selling drugs under licence.

Results

Consistent with the manipulation check of Hauser et al. (2009), subjects in the time-moving treatment were more likely to conceive of the patent expiration as approaching as opposed to the firm approaching the date of the patent expiration ($X^2(1) = 31.187$; $p = 0.000$). Subjects in the opportunity condition were significantly more likely to refer to gains when explaining their choices ($t = -2.089$; $p = 0.039$; using the LIWC continuous measure of reward-based language) and were also less likely to note the firm's lack of control over the likelihood of successful development ($X^2(1) = 5.352$; $p = 0.021$).

⁷ Consistent with the operationalization of threat as involving likely loss *and* low control and opportunity as involving likely gain *and* high control (Dutton and Jackson, 1987), I do not examine loss/gain and high control/low control separately. Empirical research confirms that perceptions of loss and low control are inherently related, as are perceptions of gain and high control (Mittal and Ross, 1998).

I conduct an ordered logit regression. I show descriptive statistics in Table A1-1 and the results in Table A1-2, including coefficients, standard errors and exact p-values. There is a positive interaction between the time-moving frame and opportunity frame on support for the future-oriented investment ($p = 0.017$). The relationship still holds after controlling for the locus of control and, in Model III, for analytic reasoning and cognitive processing. Analytic reasoning and cognitive processing were measured using the LIWC as in Study 3. The percentage change in odds for an increase of one standard deviation in the interaction term time-moving frame \times opportunity frame is 48.90%. In Figure A1-1, I plot the degree of support by temporal frame (time-moving vs. ego-moving) and by opportunity vs. threat frame. This Figure demonstrates the cross-over interaction: whereas the time-moving frame is associated with greater support for the long-term investment when it is combined with the opportunity frame, the ego-moving frame is associated with greater support when it is combined with the threat frame.

In sum, there is greater support for a long-term strategy when it is communicated using an opportunity frame than a threat frame, but only when it is framed in time-moving language. Similar to Study 3, this finding is consistent with a view of the inevitability of the future (time-moving frame) and the capacity of the firm to shape future outcomes (control beliefs inherent in the opportunity frame). It also raises interesting implications for firms' communication choices.

REFERENCES

- Apfelbaum EP, Stephens NM, Reagans RE. 2016. Beyond one-size-fits-all: Tailoring diversity approaches to the representation of social groups. *Journal of Personality and Social Psychology*, in press.
- Dantzig S, Zeelenberg R, Pecher D. 2009. Unconstraining theories of embodied cognition. *Journal of Experimental Social Psychology* **45**(2): 345-351.
- Dutton J, Jackson S. 1987. Categorizing strategic issues: Links to organizational action. *Academy of Management Review* **12**: 76-90.

- Gallese V, Lakoff G. 2005. The brain's concepts: The role of the sensory-motor system in conceptual knowledge. *Cognitive Neuropsychology* **22**(3): 455-479.
- George E, Chattopadhyay P, Sitkin SB, Barden J. 2006. Cognitive underpinnings of institutional persistence and change: A framing perspective. *Academy of Management Review* **31**(2): 347-365.
- Hardisty DJ, Pfeffer J. 2016. Intertemporal uncertainty avoidance: When the future is uncertain, people prefer the present, and when the present is uncertain, people prefer the future. *Management Science*, in press.
- Kramer T, Yoon S-O. 2007. Approach-avoidance motivation and use of affect as information. *Journal of Consumer Psychology* **17**(2): 128-138.
- Litov L, Moreton P, Zenger T. 2012. Corporate strategy, analyst coverage, and the uniqueness paradox. *Management Science* **58**(10): 1797-1815.
- Mittal V, Ross WT. 1998. The impact of positive and negative affect and issue framing on issue interpretation and risk taking. *Organizational Behavior and Human Decision Processes* **76**(3): 298-324.
- Rotter JB. 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied* **80**(1):2-28.

Table A1-1: Descriptive Statistics

	Mean	S.D.	Support for investment	Time-moving condition	Opportunity frame	Locus of control	Analytic thinking	Cognitive Processes
Support for investment	5.444	1.256						
Time-moving condition	0.492	0.501	-0.045					
			0.616					
Opportunity frame	0.484	0.502	0.049	0.000				
			0.583	1.000				
Locus of control	11.849	3.718	0.145	0.109	0.014			
			0.106	0.226	0.879			
Analytic thinking	63.538	36.381	0.081	-0.110	-0.104	0.086		
			0.369	0.219	0.246	0.338		
Cognitive processes	16.712	12.586	-0.043	-0.175	-0.077	-0.105	-0.195	
			0.630	0.050	0.390	0.243	0.028	

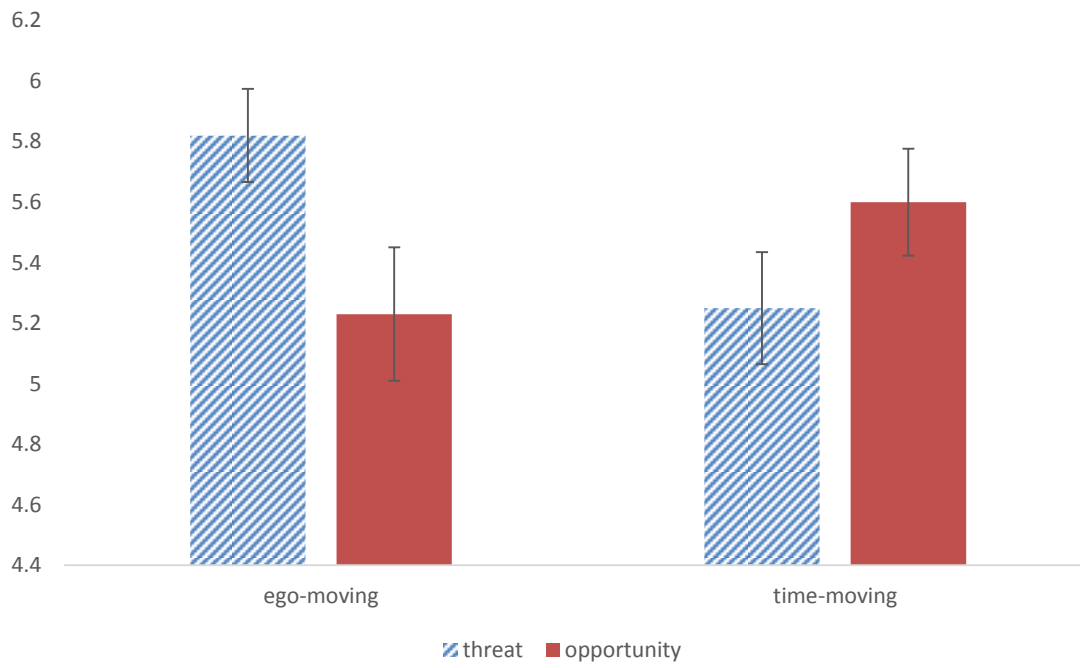
P-values are shown below the correlation coefficients.

Table A1-2: Results (Ordered Logit regression)

DV: Support for investment			
	I	II	III
Time-moving condition	-0.295 (0.329) p = 0.370	-0.285 (0.331) p = 0.389	-0.355 (0.341) p = 0.298
Locus of control	-0.003 (0.042) p = 0.952	-0.010 (0.043) p = 0.808	-0.010 (0.043) p = 0.819
Opportunity frame	-0.165 (0.326) p = 0.613	-0.166 (0.327) p = 0.612	-0.226 (0.334) p = 0.499
Time-moving condition *		1.587 (0.664) p = 0.017	1.651 (0.672) p = 0.014
Opportunity frame			-0.003 (0.004) p = 0.574
Analytic thinking			-0.012 (0.014) p = 0.383
Cognitive processes			-1.044 (0.759) p = 0.169
Native English speaker	-1.007 (0.771) p = 0.192	-1.066 (0.753) p = 0.157	
Observations	126	126	126
Pseudo R-squared (Cos-Snell/ML)	0.020	0.065	0.071
LR χ^2	2.58	8.41	9.29

(Standard errors in parentheses)

Figure A1-1. Support for long-term investment in researching new drugs with negative consequences on short-term earnings



SUPPLEMENTARY STUDY A2

BAYESIAN ANALYSIS

Bayesian estimation is often employed in studies that investigate within-subject learning and that track, for example, how people respond to cycles of stimuli (e.g. Seo, Goldfarb and Barrett, 2010). But, more generally, Bayesian inference can also be suitable for assessing data from one-shot experiments and in complementing frequentist methods (i.e. ANOVA, regression).

In essence, “Bayesian inference is merely the reallocation of credibility across a space of candidate possibilities” (Krusche, 2013: 574). In this way, Bayesian inference may have advantages over conventional null-hypothesis testing in terms of interpreting data. One specific advantage is that Bayesian analysis allows for the graded evidence for effects as opposed to the more conventional dichotomous reject and fail-to-reject decisions of frequentist methods. Thus, in the case of experiments, Bayesian analysis can thus be useful for acknowledging variance across subjects. For this reason, Rouder and Morey (2012) recommend reporting Bayesian statistics as additional evidence in some cases. The core value comes from being able to estimate a posterior distribution and a range of values—the credible interval—to which a parameter can reasonably be assigned.

Participants and Design

The data set is identical to that described in Study 3. 105 participants in a one-week corporate strategy program completed a business strategy scenario decision. Each was randomly assigned to one of two groups (ego-moving condition vs. time-moving condition). The scenario concerned a pharmaceutical firm’s potential acquisition of a biotechnology firm, which might lead the acquirer to miss its short-term earnings forecasts but might lead to an

increase in earnings in subsequent years. Subjects provided demographic information and completed a locus of control scale. For more details, please refer to Study 3.

Analysis and Results

I replicate the analysis of Study 3 using a Bayesian specification to assess the range of most credible values for the core interaction term *time-moving treatment x locus of control*. To fit the Bayesian model, I use noninformative (Jeffrey's) priors. So-called noninformative priors are usually employed when little is known about the data. In this particular instance, though a case might be made that the qualitative analysis provides some useful information, I use noninformative priors and do not "direct" the analysis to a desired outcome. The use of noninformative priors leaves maximum uncertainty about the parameter values.

I use 2,500 burn-in iterations and 10,000 subsequent Monte Carlo Markov chain iterations to generate the results. The analysis produces a complete posterior distribution of the credibility of all possible parameter values given the data set at hand. The results are shown in Table A2-1. These results display the posterior means for each coefficient, the standard deviations, and the 95% credible intervals. The 95% credibility interval for the core interaction in the analysis (*time-moving x internal locus*) is entirely within the positive range. This implies that an effect size of zero is not credible given the data. It is also worth pointing out that the 95% credibility interval for the net effect of an internal locus is predominantly in the positive range.

I plot in Figure A2-1 the posterior distribution of credible values of the *time-moving x internal locus of control* interaction term. The figure displays the density plots for the full Monte Carlo Markov chain sample, the first half of the chain, and the second half of the chain. The density is similar across both halves of the chain.

REFERENCES

- Krusche JK. 2013. Bayesian estimation supersedes the t test. *Journal of Experimental Psychology: General* **142**(2): 573-603.
- Rouder JN, Morey RD. 2012. Default Bayes factors for model selection in regression. *Multivariate Behavioral Research* **47**(6): 877-903.
- Seo M-G, Goldfarb B, Barrett LF. 2010. Affect and the framing effect within individuals over time: Risk taking in dynamic investment simulation. *Academy of Management Journal* **53**(2): 411-431.

Figure A2-1. Posterior distribution of the mean for the coefficient time-moving treatment x internal locus of control

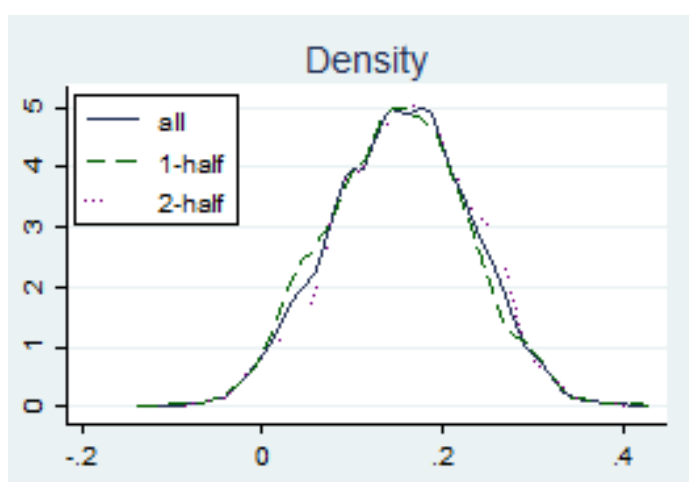


Table A2-1. Study A2: Posterior estimates

	Posterior estimates: Support for investment		
	Posterior mean	Posterior SD	95% CI
Time-moving condition	0.048	0.345	[-0.601; 0.752]
Locus of control	0.081	0.042	[-0.005; 0.164]
Time-moving condition * locus of control	0.153	0.077	[0.001; 0.302]
Native English speaker	-0.413	0.365	[-1.123; 0.348]
Pharma experience	0.615	1.006	[-1.425; 2.429]
Consulting experience	0.732	0.527	[-0.279; 1.741]
Constant	5.827	0.636	[4.577; 7.129]
Observations	105		

SUPPLEMENTARY STUDY A3

INVESTIGATING REVERSE CAUSALITY: DO SCENARIO ATTRIBUTES INFLUENCE THE USE OF TIME- AND EGO-MOVING FRAMES?

Study 3 and supplementary study A1 imply a relationship between temporal frames of reference and the kinds of decisions that managers take when there is a conflict between maximizing short-term earnings and maximizing long-term earnings. However, are some situations inherently more likely to be framed using a time-moving frame? If, for example, the long term is inherently framed using time-moving language, the relationship between temporal frames of reference and decision-making might be bidirectional. To assess this, I adopt the approach of Hauser and colleagues (2009) who show, on the one hand, that time-moving and ego-moving frames prompt different perceptions of agency and, on the other hand, that prompting people to perceive greater agency influenced whether they employ a time-moving or ego-moving frame. Similarly, Margolies and Crawford (2008) find that positive events are somewhat more likely to be interpreted using an ego-moving frame whereas negative events, such as threats, are more often interpreted using a time-moving frame.

The question here is, therefore: Is the temporal frame employed determined by the nature of the scenario? I conduct a study whereby I manipulate the event's time horizon and associated control beliefs (with investments framed as opportunities more linked to perceptions of control than those framed as threats). The experimental design is consistent with experiments in cognitive linguistics, whereby I prompt subjects with textual descriptions that differ along the dimensions of interest and subsequently identify whether subjects find the time- or ego-moving description of the future more natural than the other.

Design and Procedure

I partnered with Qualtrics Panels to recruit 101 business managers (mean age = 36.64 years, standard deviation = 10.67), all resident in the United States of America and 95 of whom were native speakers of English.

I adopted a 2x2 full factorial design. I employed the scenario of supplementary study A1, whereby a pharmaceutical firm's most important patent would expire and thus the firm faced the decision whether to invest in developing drugs for the future or could sell competitors' drugs under licence. I avoided time- and ego-moving language and introduced two treatments.

First, the timing of the future event was manipulated. Subjects in the short-term condition were informed that the patent would expire "in the immediate future (early 2017)." This time period was chosen as it was under a year away from the data collection in the summer of 2016. A period of under one year represents the short-term as per the accounting and finance literature. Subjects in the long-term condition were informed that the patent would expire "in five years' time (2021)." The period of five years represents the maximum planning horizon of most firms (Grant, 1996).

Second, the event was described as an opportunity or as a threat. Subjects in the opportunity condition were informed that "For this new era, we have to decide whether to increase our investment in research and development of new drugs. We view this juncture as an opportunity to grow our profits because we have a successful record of developing drugs." Subjects in the threat condition were informed that "For this new competitive era we have to decide whether to increase our investment in research and development of new drugs so that our future profits do not fall." These descriptions were based on Dutton and Jackson's (1987) definition of opportunities as issues that comprise potential gain and perceived control and threats as issues that comprise potential loss and lack of control. The explicit alternative to investing in research and development was to sell other companies' drugs under licence.

Consistent with Hauser and colleagues, to identify whether subjects associated the scenario with a time- or ego-moving frame, subjects were asked whether they perceived a new era to be approaching the firm (i.e. time-moving) or whether they perceived the firm as approaching a new era (i.e. ego-moving). Demographic data were collected, and the locus of control was measured using Rotter's (1966) scale.

Results

Across the 101 subjects, 52 perceived the firm to be approaching the event (ego-moving), and 49 perceived the event to be approaching the firm (time-moving). Chi-square tests reveal no relationship between being in the short-term condition and the perception of the event approaching ($X^2(1) = 0.808$; $p = 0.369$). Nor is there a relationship between being in the opportunity condition and the perception of the event approaching ($X^2(1) = 0.008$; $p = 0.928$). The results of a probit analysis are presented in Table A3-1, which includes relevant controls to predict whether subjects interpreted the scenario through an ego-moving frame.

The finding of no evident relationship between features of the scenario (long- versus short-term; opportunity, implying control and potential gain, versus threat, implying lower control and potential loss) and the temporal frame employed reinforces the potential causal effect of temporal frames on actors' decision-making. This is not to deny the findings of Hauser *et al.* (2009) and Margolies and Crawford (2008) that temporal frames can also be shaped by the scenario. Those prior studies used differences in scenarios that were arguably more extreme (e.g. neutral scenarios versus ones intended to induce anger) than those tested here that are intended to mimic the more ambiguous scenarios that confront management.

REFERENCES

- Hauser DJ, Carter MS, Meier BP. 2009. Mellow Monday and furious Friday: The approach-related link between anger and time representation. *Cognition and Emotion* **23**: 1166-1180.
- Margolies SO, Crawford LE. 2008. Event valence and spatial metaphors of time. *Cognition and Emotion* **22**(7): 1401-1414.

Rotter JB. 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied* **80**(1):2-28.

Table A3-1. Study A3: Results (probit regression)

VARIABLES	DV: Ego-moving frame		
	I	II	III
Short-term	-0.275 (0.255) p = 0.282	-0.274 (0.251) p = 0.283	-0.276 (0.256) p = 0.281
Opportunity frame	-0.019 (0.251) p = 0.940	-0.018 (0.251) p = 0.942	-0.036 -0.253 p = 0.888
Short-term * opportunity frame		-0.228 (0.503) p = 0.651	-0.191 (0.506) p = 0.707
Locus of control			0.027 (0.036) p = 0.454
Native English speaker	0.603 (0.558) p = 0.279	0.587 (0.560) p = 0.294	0.608 (0.566) p = 0.283
Constant	-0.383 (0.548) p = 0.485	-0.368 (0.550) p = 0.503	-0.719 (0.728) p = 0.324
Observations	101	101	101
R-squared	0.014	0.016	0.02
Likelihood Ratio Chi2	2.02 (3)	2.23 (4)	2.79 (5)

Standard errors in parentheses