

Participant Self-Selection Biases as a Function of Individual Differences in Time Perspective

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Individual differences in time perspective were predicted to determine when students sign-up for studies and how faithfully they meet the time obligations of research. As predicted, future-oriented students initiated and completed their research participation sooner than did present-oriented students, and females signed up sooner than did males. The additive effects of time perspective and gender strongly predicted sign-ups, with female futures signing up earliest and male presents signing up latest (Study 1). Time perspective styles also predicted participation in longitudinal research. Present-oriented students met time commitments of a multi-session diary study less reliably than did future-oriented students (Study 2). These results have implications for both research design and for daily coping.

Psychological research is often conducted with college students whose participation is required to fulfill an obligation to their introductory psychology course (see Rosenthal & Rosnow, 1975; Rosnow & Rosenthal, 1976). Students are typically free to decide when, during the course of the term, they will complete their experiment quotas. Consequently, some students sign-up promptly and complete their quotas relatively early in the term, whereas others delay their participation and finish later.

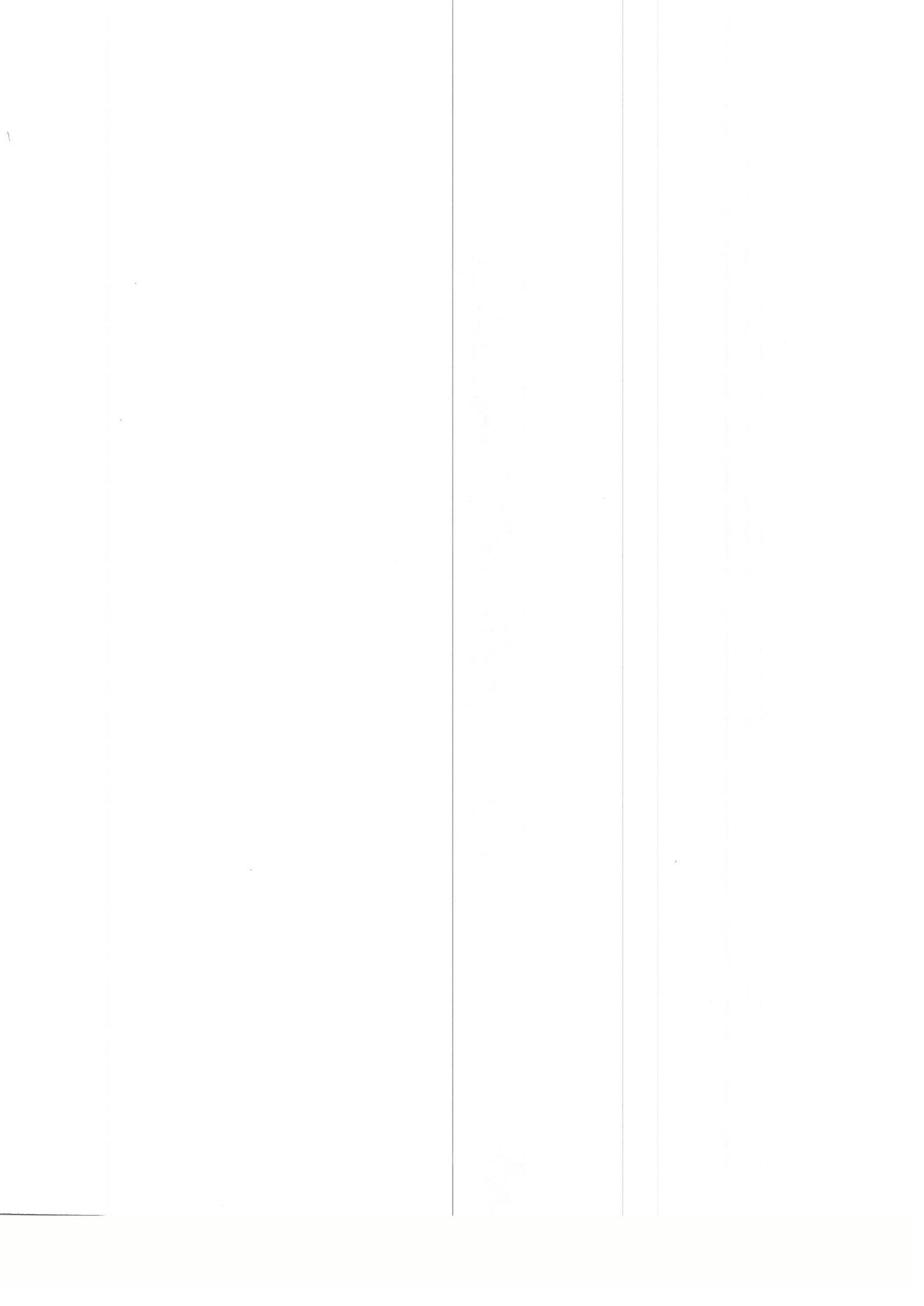
Is this volitional aspect of experiment participation systematically influenced by any individual differences, such that different types of participants sign-up for experiments at different times? If so, research conducted early in the school term might sample psychologically different participant populations than research carried out at term's end. This unrecognized difference in participant population could distort experimental results if it is causally related to the psychological processes being studied. Moreover, attempts to replicate previously established findings would suffer from such a participant self-selection bias if the

original and replication studies were conducted at different times during the term.

These important methodological concerns have received a fair amount of empirical investigation. However, research on individual differences in the timing of research sign-ups has led to mixed results. Cooper, Baumgardner, and Strathman (1991) conducted a comprehensive review of 15 personality and demographic variables (such as social desirability, self-consciousness, and extraversion), and related these variables to when students signed-up for psychology experiments. Cooper et al. reported "in general, few significant relations were found and those that did emerge were small ($r < .14$) in magnitude" (p. 109). These researchers suggest that "experimenters probably need not be concerned that timing effects threaten the external validity of psychological research outcomes (p. 109)."

However, other researchers have identified individual difference variables that do relate to sign-ups, and in ways that might impact research outcomes. Gender has been repeatedly associated with the timing of experiment sign-ups (Cooper et al., 1991; Richter, Wilson, Milner, & Senter, 1981; Roman, Moskowitz, Stein, & Eisenberg, 1995) with women signing up sooner than men. Personality variables have also been related to the timing of sign-ups. Evans and Donnerstein (1974) found that academic orientation, internal

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control, and need for achievement are all positively related to when students enlist in experiments. Roman et al. reported that personal need for structure, curiosity, and conformity predicted prompt sign-ups. Roman et al. also reported that resistance to authority predicted delayed sign-ups although Blatt and Quinlan (1967) found authoritarian values were unrelated to sign-ups.

On the face of it, this catalogue of results suggests that timing of sign-ups is related to a scattering of diverse motivational and cognitive factors. However, closer examination of these and other findings suggest a common, and in fact common-sense, factor underlying these apparently discrepant findings. This common factor, we believe, is participants' time perspective (cf., Lewin, 1948; Zimbardo & Boyd, 1999).

THE TIME PERSPECTIVE CONSTRUCT

Time Perspective is the process by which individuals automatically partition the flow of their personal experiences into psychological time frames of future, present, and past (Nuttin, 1964; Zimbardo & Boyd, 1999). According to Lewin (1948), a future orientation is shaped largely by goals and a tendency to relate immediate choices to more distant objectives. A present orientation is more focused upon immediate events in themselves and diminished concern for, or interest in, future consequences. There is a volitional aspect to time perspective, such that people can select the time perspective that best meets present objectives (Karniol & Ross, 1996). For example, parents choosing to spend quality time playing with their children may deliberately become present-oriented and then later assume a future-oriented mind-set as they consider their children's educational options. Time perspective can also be shaped by situations (Levine, 1997; Lewin, 1948). For example, a dinner party may foster a present orientation, whereas a workshop on personal finances is likely to evoke a future orientation.

However, distinctive time perspectives may also reflect enduring individual differences (Karniol & Ross, 1996; Nuttin, 1985; Strathman, Gleicher, Boninger, & Edwards, 1994; Trommsdorf & Lamm, 1975; Zimbardo & Boyd, 1999). Social class, culture, education, religion, family models, and occupation may condition a person's orientation toward the present or the future (Levine, 1997; Lewin, 1951; Teahan, 1958).¹ Indeed, time perspective investigators have identified time perspective types that correspond to these temporal categories. A future-oriented person is someone whose decisions at any given moment are largely influenced by abstract mental representations of future consequences and concerns for

¹Because the current research does not concern itself with past orientation, this temporal dimension is not discussed here. However, see Karniol and Ross (1996) and Zimbardo and Boyd (1999) for discussions of past orientation.

responsibility, liability, gains, and losses (Kastenbaum, 1961; Strathman et al., 1994). Because distal goals are so salient for them, future-oriented people are better able to resist the temptations of the immediate setting that might distract them from their long-term objectives. Present-oriented people, in contrast, attend more to the concrete reality of the immediate present (Baumeister, 1990; Zimbardo & Boyd, 1999; Zimbardo, Keough, & Boyd, 1997). These people are therefore less likely to ponder potential costs and consequences, or to ruminate over past deeds and the meaning of past experience, when enmeshed in a decision or action moment.

Future-, present-, and past-oriented individuals can be identified by their scores on the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). Factors derived from the ZTPI are closely related to consideration of future outcomes and life management skills. Thus, the future orientation subscale is positively related to health prophylaxes (Zimbardo, Keough, & Boyd, 1997) and academic achievement (Zimbardo & Boyd, 1996; Zabel, 1997). The present orientation subscale is positively related to the discounting of delayed rewards (Harber, Green, & Myerson, 1997), to risk-taking behaviors (Zimbardo, Keough, & Boyd, 1997), HIV prevention (Rothspan & Read, 1996), chronic homelessness (Epel, Bandura, & Zimbardo, 1999), and alcohol and substance use and abuse (Keough, Zimbardo, & Boyd, 1999; Strathman et al., 1994).²

Finally, time perspective predicts subjective definitions of the future. Harber et al. (1997) gave future-oriented and present-oriented participants timelines that included yearly increments up to the year 2060. Participants were instructed to indicate on these timelines the years at which the "near future" and the "remote future" began. Timeline data showed, as expected, that future-oriented participants project both the present and the future further out in time than do present-oriented participants. These results suggest that future-oriented people "see" further out in time than do the present-oriented, and should therefore realize corresponding advantages in terms of future planning.

TIME PERSPECTIVE AND PARTICIPANT SIGN-UPS

A review of the earlier research on experiment sign-ups suggests that time perspective may be an important and underlying explanation for when participants register for experiments. For example, Blatt and Quinlan (1967) found that temporal parameters (e.g., future time extension) predicted timing of sign-ups, whereas nontemporal variables such as authoritarian values, divergent thinking, and general intelligence were unrelated to sign-ups. Studies relating Type A personality to experiment sign-ups (Gastorf, 1980; Strube,

²Present orientation also has important positive aspects. For example, it allows one to be more fully absorbed by tasks, to more freely explore, and is associated with creativity (Zimbardo, Warren, & Maslach, 1996).

1982) have shown that students high in the time-urgency component of the Type A personality index arrive for experiments sooner than do students low in this characteristic. Strube's results were both statistically significant and of substantial effect size, and counter Strahan's (1981) criticism that the influence of Type A on experiment sign-ups is too weak to merit serious methodological concern to researchers. Strube concludes that "individual differences (in Type A) may have a major impact on the external and internal validity of psychological research" (Strube, 1982, p. 565).

The Roman et al. (1995) results are also interpretable within the context of time perspective. The Personal Need for Structure (PNS) scale (Neuberg & Newsom, 1993) used by Roman et al. measures "tendencies toward seeking an organized and clearly structured life (p. 120)." Four of the twelve items comprising this scale explicitly refer to time or time management. In an attempt to better understand how control motives might moderate when students enlist in studies, Roman et al. also administered the Desire for Control (DC) scale (Burger & Cooper, 1979). Of the five subfactors that comprise the DC scale, only the one related to future planning (i.e., "desire to be prepared for situations") was related to experiment sign-ups.

To summarize, a sensibility about time appears to underlie several of the variables that do predict experiment sign-ups. Some of these, such as time urgency (Gastorf, 1980; Strube, 1982), future time extension (Blatt & Quinlan, 1967), and the desire to be prepared for situations (Roman et al., 1995) have an explicit temporal reference. Others, such as personal need for structure, action-oriented, and resourceful (Roman et al., 1995) are based upon tendencies that are themselves inherently time-relevant in that they are defined by planning, organizing, and strategizing. Thus, consideration of time, and time management habits and attitudes, recur as predictors in studies of experiment sign-ups.

TESTING THE RELATION BETWEEN TIME PERSPECTIVE AND EXPERIMENT PARTICIPATION

These general conceptions, and much accumulated data on the psychological dynamics of time perspective, lead us to hypothesize that individual differences in time perspective will affect the degree to which students sign-up for psychology research. Specifically, we predicted that future-oriented students (futures), whose time perspective favors planning, scheduling, and task completion, would sign-up earlier in the term and complete their entire experiment requirement sooner than would present-oriented students (presents), for whom time-based obligations are often eclipsed by immediate concerns. The presents, who plan less and are less preoccupied with future outcomes, should be more likely than futures to delay initiating their participation, and should take longer to complete their experiment participation quotas. Finally, time perspective differences should affect how

faithfully participants meet the scheduling demands of longitudinal studies that rely on participants to keep daily records and to submit reports in a timely fashion. Futures are expected to honor these demands more reliably than presents.

These two studies that comprise the present research address each of these hypothesized associations between individual differences in time perspective, and the timeliness and reliability of research participation. Study 1 tests the prediction that experiments conducted early in the term and those conducted late in the term are more likely to draw future-oriented and present-oriented students, respectively. It also tests the prediction that time orientation will influence students' choices about when they sign-up for experiments, such that futures will sign-up earlier and presents will sign-up later. Study 2 tests the prediction that future-oriented participants will be more reliable contributors to longitudinal research than will present-oriented participants.

STUDY 1

This study attempted to show that students' time orientation influence when they choose to participate in studies. Students' gender, which has also been repeatedly identified as a predictor of sign-ups, was also monitored and the relation between gender and time perspective was explored.

Method

Participants

Data were collected from 167 students (82 women and 85 men) enrolled in an introductory psychology course at Stanford University. One of the course requirements was participation in 6 hr of research during the quarter-term period of about 10 weeks. Early in the term, students could earn 1 hr of required research by completing a packet of inventories used as the basis for preselecting research participants in particular studies. Of the 231 students enrolled in the class, 221 (95%) completed the preselection packets (thereby reducing their experiment obligation from six studies to five). One of the measures included in the preselection packet was the ZTPI. The 167 students comprising our initial sample were those who completed the time perspective measure and who also fulfilled their experiment participation requirement by term's end.

Procedure

Our procedure involved two phases: first, monitoring the dates of research participation of all students using information gathered from experiment sign-up records and, second, identifying students as being either future-oriented

or present-oriented based on their ZTPI scores. Previous research has indicated that gender may determine experiment participation (Cooper et al., 1991; Richter et al., 1981; Roman, et al., 1995). In order to distinguish the unique role of time perspective on experiment participation, gender was also recorded.

Monitoring experiment participation. Psychology students at the Stanford psychology department typically enlist in studies, for a specific date and time, by signing their names to registration sheets that researchers post outside the Introductory Psychology lecture hall.³ Students are obligated to arrive on time for scheduled experiments and can incur penalties (in the form of an increase in their experiment participation hours) if they are delinquent. Students who do not complete their experiment obligations, or who do not remedy delinquencies, face a suspension of course credit. Students therefore have ample incentive to comply with the experiment participation requirement, and also to do so in a timely manner.

Experiment certification cards, carried by students and signed by experimenters, verify the dates on which students satisfy each of their required experiment hours. These cards, submitted to the participant pool coordinator at the end of the term, were the primary source of our experiment completion data. Experiment cards made it possible to establish exactly when students began to accrue the required credits for each of their required experiment sessions.

To calculate how quickly students fulfilled their participation obligation, the following system was used: Each experiment participation credit a student obtained was assigned a number between 1 and 75, corresponding to the total number of days into the term when this credit was earned. For example, an experiment participation credit earned on the 30th day of the term would be scored as a 30. Students were assigned five scores, corresponding to the number of days into the term when they completed each of their five required experiment sessions. The sooner an experiment session was completed, the lower was the completion score it received.

Time perspective classifications. Participants were identified as presents or as futures based on their responses to the ZTPI, which was administered at the start of the term as part of a comprehensive survey of students in the participant pool. The ZTPI is a 56-item self-report instrument that samples respondents' time-relevant attitudes and habits by asking participants to answer how characteristic each statement is of them, using 5-point Likert scales. The ZTPI consists of five subscales that measure future orientation, present hedonism, present fatalism, past-positive, and past-negative. Test retest reliabilities on these factors range from

³Some students are also recruited by experimenters, who schedule experiment sessions either in person or over the telephone.

.70 to .80.⁴ The ZTPI has demonstrated predictive and construct validity. Zimbardo and Boyd (1999) show that the ZTPI factors correlate in the predicted directions to 17 indexes of coping, temperament, and personality. For example, future-oriented people, whose lives are more guided by long-term goals, value consistency (cf., Cialdini, Trost, & Newsom, 1995) in their daily lives ($r = .48$), whereas the present-oriented, who are more attentive to immediate circumstances, value consistency less ($r = -.34$). Strathman et al. (1994) report that an earlier version of the future orientation component of the ZTPI correlates highly ($r = .43$) with their own Consideration of Future Consequences (CFC) instrument.⁵

Although negatively related ($r = -.34$), future orientation and present orientation are not entirely exclusive. Any given person may be a combination of the two. It is conceivable, for example, that a generally future-oriented person may enjoy risk-taking and parties but only after meeting prior obligations. Similarly, a present-oriented person may at times write "to do" lists and resist immediate enticements under the crush of impending or overdue deadlines. To examine the time perspectives in their purest form, categories were created in which only extremes of each type were represented. Thus, students were classified as future-oriented if they scored in the top quartile of the future-oriented scale, but below the top quartile of the present-oriented scale. Similarly, students were classified as present-oriented if they scored within the top quartile on the present-oriented scale, but below the top quartile on the future-oriented scale. Of the 167 students we tracked in this study, 40 (24%) met our criteria for future orientation, and 40 (24%) fit the present orientation classification. These 80 students were the subsample from whom data were collected on the timing of their research participation in this study.

Results and Discussion

The times at which students chose to complete their required five experiments constituted our outcome measures. These five sign-up opportunities are not independent; for example, the date when the first experiment is completed necessarily constrains when the remaining four can be done. Correlations between sign-up dates across the five experiments, which range from $r = .83$ (experiment 1 and experiment 2) to $r = .46$ (experiment 1 and experiment 5), demonstrate the close association between these outcomes. For this reason we restricted our factorial ANOVA to three measures; the time when students began their experiment participation, the time when students completed their experiment participation, and the

⁴See Zimbardo and Boyd, 1999, for complete discussion of the ZTPI psychometric properties.

⁵The future orientation subscale of the ZTPI reliably accounted for alcohol consumption beyond that of the CFC scale. Neither a delay of gratification scale nor a Locus of Control scale could account for this effect (Strathman et al. 1994).

average completion time of the three middle studies. Time perspective classification (present orientation vs. future orientation) and gender were included as independent variables in these two-way analyses.

Time Perspective

Our predictions regarding the relationship between time perspective and the timeliness of experiment sign-ups were confirmed. Futures began their experiment participation 7.25 days sooner ($M = 21.12$, $SD = 13.27$) than presents ($M = 28.37$, $SD = 16.86$), $F(1, 79) = 3.72$, $p < .06$, $\eta = .05$ and completed their entire quotas 5.43 days sooner ($M = 54.00$, $SD = 14.66$) than presents ($M = 59.43$, $SD = 8.55$), $F(1, 79) = 3.18$, $p < .08$, $\eta = .04$. Futures completed their middle studies (taken as an average) 7.78 days sooner ($M = 38.75$, $SD = 15.86$) than did presents ($M = 46.53$, $SD = 13.64$), $F(1, 79) = 4.26$, $p < .05$, $\eta = .05$.

Gender Differences

Female students addressed their experiment obligations more promptly than did male students. Women completed their experiment quotas 7.26 days sooner ($M = 52.81$, $SD = 14.75$) than did men ($M = 60.07$, $SD = 8.37$), $F(1, 79) = 6.38$, $p < .02$, ($\eta = .08$, and completed their middle studies 12 days sooner ($M = 36.08$, $SD = 14.90$) than men ($M = 48.29$, $SD = 13.20$), $F(1, 79) = 13.30$, $p < .001$, $\eta = .15$. However, although women began their quotas 5.37 days ($M = 21.86$, $SD = 13.71$) sooner than men ($M = 27.23$, $SD = 16.67$), this difference was not significant, $F(1, 79) = 1.75$, $p = .19$.

We were curious if these robust gender differences played any part in our time perspective findings and therefore examined relationships between time perspective subscales and gender. The sexes did not differ in regards to future orientation (men $M = 3.47$, $SD = 0.61$; women $M = 3.42$, $SD = 0.65$) $F(1, 196) = .36$, $p = .58$, $\eta = .002$. However, men scored higher on present orientation ($M = 2.77$, $SD = 0.64$) than did women ($M = 2.57$, $SD = 0.60$), $F(1, 196) = 5.84$, $p < .02$, $\eta = .03$.⁶ The distribution of men and women in our time perspective subgroups similarly showed virtually identical percentages of men (47.9%) and women (52.1%) in the future orientation group but a somewhat greater percentage of men (61.7%) compared to women (38.3%) in the present orientation group. However, this imbalance was not significant, $\chi^2(1, N = 80) = 1.82$, $p < .22$.

Although related to time perspective, gender does not appear to explain our observed time perspective difference in experiment participation. There were no interactions between time perspective and gender for completion of the first experiment, $F(1, 79) = 0.05$, $p = .82$, $\eta = .001$, completion of the final experiment, $F(1, 79) = 0.27$, $p = .72$, $\eta = .004$, or

⁶These analyses are based on the entire sample of student participating in the participant pool, and not only those whom we classified as future-oriented and present-oriented.

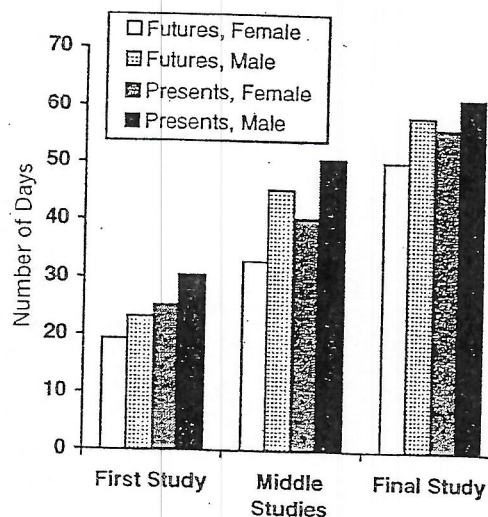


FIGURE 1 The number of days into the term when students completed the first, middle, and final studies comprising their experiment participation requirement, as a joint function of gender and time orientation. "Middle studies" represents the average of studies 2, 3, and 4.

completion of the middle experiments, $F(1, 79) = 0.13$, $p = .61$, $\eta = .001$.

Additive Effects of Time Perspective and Gender

Because time perspective and gender both appear to be potent predictors of when students sign-up for studies, we explored the sign-up patterns of female futures, male futures, female presents, and male presents. As Figure 1 indicates, the additive effects of time perspective and gender lead to quite disparate experiment sign-up patterns among the two most extreme groups—future-oriented women and present-oriented men. Post-hoc tests indicate that these differences are reliable. Thus, female futures began experiments 11.17 days sooner ($M = 19.33$, $SD = 11.76$) than did male presents ($M = 30.50$, $SD = 17.60$), $p < .08$, completed the middle portion of their quotas 17.83 days sooner ($M = 32.81$, $SD = 14.87$) did male presents ($M = 50.64$, $SD = 11.77$), $p < .001$, and completed their final experiment 11.35 days ($M = 50.19$, $SD = 17.48$) sooner than did male presents ($M = 61.54$, $SD = 7.22$), $p < .01$.⁷ These results indicate that future-oriented women are particularly likely to embark on their experiment obligations quickly and complete them early in the term, whereas present-oriented men are prone to delay their experiment obligations and to complete them late in the term. Indeed, the average difference in the timing of experiment participation between these most extreme groups can amount to two-and-a-half weeks.

A practical question these results are likely to raise for researchers is whether the odds of sampling different types of

⁷All post-hoc analyses are computed using the Tukey test of multiple comparisons (cf., Keppel, 1991).

students change over the course of the academic term. We computed odds ratios (c.f., Kerlinger & Lee, 2000) that students from the four time perspective/gender groups would enlist in research during the beginning, middle, or end of the school term. These odds ratios are presented in Table 1. They show that studies run in the beginning of the term are much more likely to sample female futures and much less likely to sample male presents (the two most disparate subgroups) than are studies conducted at the end of term, where the odds of sampling female futures are very low and the odds of sampling male presents are very high. Studies conducted in the middle of the term did not favor the selection of any time perspective/gender subgroup.

STUDY 2

Study 1 demonstrated that time perspective predicts how soon members of a participant pool will sign-up for required research. These results led us to our next question, which concerns how reliably participants of different time perspectives meet time obligations within a single study. Longitudinal designs often require participants to make contributions at preset dates over an extended time period. In order to fulfill this time commitment, participants must attend to a protracted series of deadlines. We expected that future-oriented students, who engage in planning and who value satisfying time commitments, would more faithfully maintain ongoing time commitments of longitudinal research than would present-oriented students. Study 2 tested this prediction.

Research conducted by colleagues coincided with our second study and supplied us with an opportunity to test whether futures are more reliable participants in longitudinal designs than are presents. These researchers administered a month-long longitudinal study that tracked daily fluctuations in participants' emotions (Nolen-Hoeksema, Morrow, & Fredrickson, 1993). Certain features of this study made it ideal for our purposes: This study asked participants to make and maintain an extensive (30-day) time commitment, to complete daily tasks (i.e., short self-report emotion surveys), and to follow a fixed participation schedule (related to

TABLE 1
Odds Ratios Demonstrating Likelihood of Sampling the Four Time Orientation/Gender Groupings During the First, Middle, or Final Third of the Term

| | <i>Female Future (n = 102)</i> | <i>Male Future (n = 75)</i> | <i>Female Present (n = 86)</i> | <i>Male Present (n = 112)</i> |
|----------------------|--|-------------------------------------|--|---------------------------------------|
| First third of term | 2.57 | 0.79 | 1.29 | 0.33 |
| Middle third of term | 1.03 | 0.78 | 1.08 | 1.10 |
| Final third of term | 0.39 | 1.45 | 0.75 | 2.05 |

Note. Odds ratios (OR) compare the likelihood of sampling a given group at one portion of the term (1st third, 2nd third, or 3rd third) to all other times in the term.

tri-weekly submissions of these surveys to research staff). Referred to by its authors as the "Emotion Diary Study," the comprehensive record keeping of this project made it possible for us to explore how differences in time perspective affect the honoring of extended time commitments in longitudinal studies.

We predicted that present-oriented participants would be more delinquent than future-oriented participants in meeting the on-going temporal commitments of longitudinal research. Although presents might be as attracted to the initial descriptions of longitudinal participation as futures, their ability to remain faithful to the on-going obligations of longitudinal designs should be relatively tenuous. This is because presents attend more to immediate circumstances, and can therefore be more easily distracted away from long-term goals. Futures, who are more accustomed to setting their sights on distal outcomes, are less distracted by immediate circumstances. For these reasons, we expected that presents would be less reliable as on-going contributors to longitudinal designs, compared to futures.

Method

Participants

Initial data were supplied by 221 Introductory Psychology students of both sexes who completed the omnibus preselection surveys administered at the start of the course (95% of all students in the class). Of these, 129 (58%) agreed to participate in the Diary Study (47% women). We identified futures and presents within this subpopulation, using the procedures described in Study 1. Forty-seven (21%) of the initial cadre of Diary Study volunteers were futures and 55 (25%) were presents. There were no sex differences between these two groups, $\chi^2(1, N = 56) = 0.47$, $p = .49$.

Procedure

This research is a "study of a study," wherein students' willingness to participate in an experiment, and their reliability as experimental participants, constitute the dependent measures. To sensibly interpret the impact of time perspective upon such behaviors it is important to consider the context within which these choices were made. For this reason, we will briefly outline relevant aspects of the Emotion Diary Study including the time obligations required of its participants, the inducements offered to entice participants to enlist, and the steps taken by Emotion Diary Study staff to ensure participants' faithful compliance with the study's time-bound requirements.

The Emotion Diary Study Invitation. Students who registered interest in this study were invited to attend an

orientation meeting at which the study's time demands were described in detail. At this meeting, students were informed that the emotion self-report forms would take only about 3 min a day to complete, that completed forms had to be hand-delivered to the psychology department on Mondays and Wednesdays (which were the days that their psychology class met) and also on Fridays, and that this study would require up to 3 hr of their time—an estimate that included attendance at both the orientation meeting and at a concluding meeting. After detailing these conditions, the experimenters strenuously emphasized that timely and consistent completion of the daily self-reports was of the utmost importance. Prospective participants were asked not to volunteer for this study if they lacked confidence in their ability to meet these requirements. Students were then reminded that this study offered two units of experimental credit and that by completing this study they would be eligible to win either a \$150 prize, a \$75 prize, or one of two \$25 prizes in a postexperiment raffle.

Aids to timely completion of self-reports. Emotion Diary Study participants were supplied a variety of devices to help them meet their weekly experimental duties. These included an instruction sheet specifying the times, days, and location of self-report delivery and a 30-day calendar upon which self-report submission dates and times were written. Participants were also encouraged (orally, and in the instruction sheet) to complete their entries at the same time each day. Although the intent of this instruction was to control for time-related mood effects, it may have also supplied participants a structured routine for self-report completion. Participants who submitted late self-reports were contacted by staff within 24 hr and were reminded of their experimental obligations.

Documentation concerning Emotion Diary Study participation. Emotion Diary Study research staff maintained careful records of all stages of study participation. From these records, we were able to determine which students submitted late (and therefore unusable) materials, and which participants dropped out from the study prematurely. We were also able to identify which students were first to sign up for this study.

Results and Discussion

Preliminary Analyses

Our principal prediction concerns the timeliness of data submission as a function of time perspective type. It was therefore important to establish that futures and presents were equally represented in this study. Cross-tabulations confirm that the time perspective groups did not differ in their rate of initial enlistment $\chi^2(1, N = 95) = 0.01, p = .97$.

The Emotion Diary Study encountered some attrition,⁸ such that 32 of the original 129 enlistees dropped out of this study at various stages. However, although this attrition reduced the combined sample of futures and presents from 57 to 36, the final representation of futures ($N = 19$) and presents ($N = 17$) was not systematically changed $\chi^2(1, N = 57) = 0.14, p = .71$.

Main Analyses

Time perspective. As predicted, this study revealed time-related differences in tardiness rates. Present-oriented participants more frequently missed self-report submission deadlines than did their future-oriented counterparts $F(1, 35) = 12.92, p < .001, \eta = .28$. Present-oriented participants were tardy an average of 3.5 times ($SD = 2.50$), whereas future-oriented participants typically were tardy, on average, only 0.89 times ($SD = 1.76$). Recall that students had been repeatedly told of the vital reason for on-time submissions, and that delayed diary entries had to be discarded because it was not possible to determine when they were actually completed. Despite these multiple external prompts, those who were present-oriented were more than three times as likely to fail in meeting this requirement than were their future-focused peers.

Emotion. There were no differences on any of the emotion measures between tardy and timely responders (Nolen-Hoeksema, personal communication, 9/30/93). This means that the greater tardiness of the present-oriented students, cannot be readily attributed to the operation of an emotional variable, such as dysthymia.

Gender differences. Because gender played a significant role in Study 1, as well as in the Cooper et al. (1991) study, we examined gender differences in experiment participation among Emotion Diary Study participants. Women did not differ from men in their willingness to volunteer, nor in their likelihood of remaining in this study, compared to men. Surprisingly, there was a paradoxical reversal of previous trends on the measure of meeting regular submission deadlines; women were more likely to be tardy in submitting their self-reports ($M = 2.94, SD = 1.42$) than were men ($M = 1.42, SD = 2.01$), $F(1, 67) = 8.72, p < .005, \eta = .12$, even though men are generally more present-oriented. However, the interaction between gender and time perspective on late submissions was not significant $F(1, 35) = 0.02, p = .89, \eta = .001$. These results indicate that although women may more promptly sign-up and complete experiment quotas (as per Study 1) they do not seem to be more reliable as participants in long-term research than men.

⁸This is probably due to the duration of activity it required of participants.

GENERAL DISCUSSION

Across the two studies that comprise this research we found that individual differences in time perspective influenced how promptly (Study 1) and reliably (Study 2) students complete their research obligations. Study 1 showed that future-oriented students place themselves on a "fast track" toward completing their required experiments, compared to their present-oriented peers. Futures began enlisting in studies about one week sooner than presents and maintained this lead throughout the term. Study 1 also reconfirmed earlier findings regarding women's greater punctuality compared to men's (e.g., Cooper et al., 1991; Richter et al., 1981; and Roman et al., 1995). The combination of time perspective and gender led to particularly robust outcomes. On average, female futures started their required experiments two weeks sooner, completed the middle portion of their experiments two-and-a-half weeks sooner, and completed their entire experiment quotas one-and-a-half weeks sooner, than did male presents. It may be that the increased willingness to be helpful and cooperative characteristic of women (Leventhal & Anderson, 1970; Major & Deaux, 1982), combined with the organizational advantages of having a future time perspective, lead future-oriented women to more promptly satisfy their experiment participation obligations.

Time Perspective and Meeting Extended Obligations

Study 2 showed that time perspective also affects compliance with the demands of longitudinal research. Presents were more frequently delinquent than were futures in meeting vital data collection obligations in the Nolen-Hoeksema, et al. (1993) Emotion Diary Study. These compliance rates were consequential. The tardiness of the presents meant that, compared to the futures, a third more of their emotion self-report data could not be used. Such delinquency becomes more notable given the extensive precautions the researchers had taken precisely to prevent such data loss, and the prior public contractual commitment all participants made to honor this research obligation (see Cialdini, 1988).

Study 2 did not show differences between presents and futures in either their willingness to sign-up for longitudinal research, or to stick with it through the duration. Neither of these results is inconsistent with the time perspective construct. The attractive incentives and personalized inducements adopted by researchers to obtain initial commitment could have been equally appealing to both presents and futures, and were therefore likely to have offset between-group differences in study enrollment. Continued participation should have similarly been sustained across time perspectives, due to the several inducements the researchers presented to participants. Among these were the researchers' on-going coaxing of tardy participants to stay in this study (which included the promise of monetary rewards for study

completion), the departmental requirement that students complete six hours of study participation, and the attendant penalties for quitting studies. Individually or collectively, these considerations may account for the minimal attrition in this study, as well as the absence of between-group differences in drop-out rates. Under less externally controlled circumstances retention in longitudinal research might be vulnerable to self-selection biases related to time perspective.

Relative Impact of Time Perspective on Experiment Sign-Ups

Previous research provided a mixed picture of the influence of individual differences on time perspective. The Cooper et al. (1991) comprehensive study found few significant effects and concluded that these were of little consequence. However, researchers who examined the influence of time-related factors such as Type A Personality (Gastorf, 1980; Strube, 1982) and future time extension (Blatt & Quinlan, 1967) did find reliable and sizable differences. This research, which directly tests the role of time perspective, provides strong additional evidence in line with these earlier studies. It shows that the relative odds of recruiting future-oriented and present-oriented students vary reliably and substantially over the course of the term. Gender, too, was a reliable index of participant sampling, and the additive effect of time perspective and gender proved a quite powerful predictor of who shows up for experiments and when they arrive. To summarize, the present findings suggest that students of different time perspectives and genders are not randomly distributed across the academic term in self-scheduling participant pools.

Relevance of Time Perspective to Research Designs

The present research may have important implications for psychological research. The odds ratio calculations (presented in Table 1) suggest that studies conducted early in the term will have an over-representation of future-oriented women, whereas those conducted at the end of the term will have an over-representation of present-oriented men. Studies that concern variables related to time perspective (e.g., risk-taking, intrinsic motivation, creativity, and problem solving) may therefore be affected by whether they are conducted early or late in the term. Failures to replicate earlier studies may also be due to this unrecognized temporal bias if an original study and its attempted replications are conducted at the opposite ends of the participant participation period.⁹

⁹Note that the data for this set of studies come from classes that are on a quarter system, which meet for about five fewer weeks per term than in a semester, where students have more time to select their participation dates. For this reason, the effects we report here may be greater in institutions that operate on the semester system.

Research on intrinsic motivation (Hom, 1987) shows time-of-term effects consistent with this analysis. Hom reports that offering students external rewards undermined task performance (replicating Amabile, 1983), but only for students tested early in the term and not among those who signed up later. Although Hom offers no explanation for these time-of-term effects, they are consistent with our time perspective analysis. Students sampled early in the term are more likely to be futures, for whom the present moment is seen as means for achieving future outcomes. This more instrumental orientation may make futures more responsive to extrinsic constraints, and therefore a population better-suited to confirming the predictions Hom investigated. Conversely presents, who are more attentive to properties inhering to the immediate situation, may be less responsive to extrinsic rewards. Thus a motivation and performance study conducted at the end of term, when presents are more heavily represented, may fail to show the predicted association between extrinsic reward and performance decrement.

Experiment attrition is another way in which time perspective may bias research outcomes. In the Emotion Diary Study, presents were more delinquent than futures in meeting data submission deadlines. In a related set of studies, presents came late to experiments significantly more often than did futures, and were more likely not to show up at all for prescheduled research sessions (Harber et al., 1997). These tendencies again pose practical implications for researchers. For example, the presents' greater no-show rate can bias and disrupt studies that rely on forming dyads or groups. Such studies may become more difficult to conduct toward the end of the term due to high attrition among the presents. As a result of this attrition, the population that is tested may be over-represented by the more strategic and less impulsive futures. Presents' tardy completion of self-report materials can also disrupt longitudinal designs. This delinquency represented lost data in the Nolen-Hoeksema et al. (1993) study, despite the researchers' exhaustive efforts to secure timely responses. As a result, Nolen-Hoeksema et al. were forced to discard late surveys in order to maintain the integrity of their data set, and they unknowingly discarded data from presents three times more often than from futures.

Taken together, these findings suggest that present-oriented individuals will be under-sampled in studies conducted early in the term and especially in studies with intense temporal demands. If time perspective unwittingly influences the variables or processes under investigation, then conclusions advanced on the basis of sound empirical procedures could be seriously flawed or even wrong.

Time Perspective and Daily Coping

The relationship between time perspective and the meeting of time-based obligations has implications that go beyond experiment administration. Our society is very much bound to the

clock and to the calendar (Levine, 1997). We often judge our fellows, and expect to be judged by them, to the extent that temporal norms are followed (Levine, 1997). Showing up late for work or failing to meet work deadlines, delays in repaying debts, or missing social appointments can sully reputations and undermine relationships. Because of the importance our culture places on being punctual, time perspective may prove an important predictor of social adjustment.

In this regard, it is important to consider that time perspective can be shaped by current and enduring social constraints. For people living in extreme poverty, or for those living in the midst of chronic violence or hardship, the most relevant timeframe is often the immediate present (Lewin, 1948; Trommsdorff and Lamm, 1975). Such circumstances militate against even moderate-term planning. Thus, a foreshortened time perspective, and the behaviors that follow from it, may be the product, rather than the cause, of underprivileged circumstances. For example, the longer people spend in a condition of homelessness, the lower is their future orientation (Epel, Bandura, & Zimbardo, 1999). Higher drop-out rates among economically disadvantaged students may similarly reflect the discrepancy these students face between economic and social circumstances that favor a present orientation, and the school environments that favor a future orientation (see Nurmi, 1987; 1991). In this way, time perspective may operate as a nonobvious background variable that underlies more salient race or ethnic differences in school achievement (Lamm, Schmidt, & Trommsdorff, 1976).

Although there are clear social benefits to being future-oriented, this time orientation should not be regarded as a superior character attribute. When a given timeframe comes to dominate actions, it has adaptive value in situations where it fits and is appropriate to task demands, but where it is not, a relatively fixed time perspective may prove disruptive. Thus, in situations that benefit from a propensity toward planning and scheduling, such as school and work, being future-oriented can supply a clear advantage. However, that same orientation, in the extreme, may hinder pursuits that require attention to nuance, a capacity for spontaneity, an appetite for exploration, or an appreciation for things as they are. Thus, a present orientation may be critical for establishing and sustaining social bonds, for immersion in creative pursuits, or for engaging in restorative recreation.

CONCLUSION

Students jump into the participant research pool at different times, swim across it at different rates, and some may not even get to the end of the pool if there are appealing distractions along the way. These differences are not random, but appear to reflect students' time perspectives, gender, and most potently, the combination of time perspective and gender. Being mindful of these factors may improve

the integrity of participant sampling and thereby enhance the reliability and validity of psychological research.

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