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The Effects of a Positive Reward System on Student Procrastination

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INTRODUCTION

Procrastination

We generally assess projects that we do not initiate, do not have control over, or those where we are not sure how to proceed, as aversive. Aversion has been shown to be positively correlated with procrastination (2). Academic tasks are often more anxiety provoking than other life tasks, and as such, are more likely to produce avoidance or procrastinating behaviors (9). The anxiety arising from academic tasks is the result of subjective grading standards coincident with rigid and inflexible deadlines, whereas, most life tasks are not subject to such scrutiny and often have more liberal time constraints (10). As shown in many previous studies, task aversion is one of the primary motivations for academic procrastination (10, 11, 13). Steel et al. (14) posit that procrastination is an excellent and reliable predictor of performance, although some final-hour catching-up is possible.

Solomon and Rothblum (13) suggest that students are more likely to procrastinate on unstructured or semi-structured tasks, such as writing a paper or computer program, and tend to procrastinate less on structured tasks, such as reading the textbook or taking an exam. However, of greater concern, Solomon and Rothblum (13) also estimate that "at least half of all students *consistently and problematically* procrastinate." Ellis and Knaus (4) estimated that the number of students who procrastinate at some point approaches 95 percent. As reviewed by Ferrari, et al. (5), approximately 70% of U.S. college students engage in frequent procrastination. This same study also showed that this phenomenon occurs regardless of race or gender; however, as one would logically expect, academic procrastination declines with age/maturity.

Milgram, et al. (10) concludes that procrastination only provides temporary relief from anxiety, since the procrastinators must, at some point, face the consequences of failing to complete a task on time or the results of poor performance from performing required tasks in the final hour. Aitken (1) posits that procrastinators tend to estimate improperly the time needed to perform a task. From an economic perspective, Fischer (6) writes:

> *"…when the work requirement demands many units of effort over a finite amount of time, when will that effort take place? The answer lies in the simple idea that leisure time is an exhaustible resource. When a fixed amount of work must be done by a distant deadline, leisure time in the interim is an exhaustible resource to be consumed over time until the deadline, subject to a cumulative stock constraint. People like leisure and prefer it sooner rather than later; time can be allocated between work and leisure, but a certain amount of cumulative hours of work is required by some deadline. The person thus weighs the gains from taking leisure now against the utility costs of having to do more work later."*

Excuses

A study by Keene, et al. (7) indicated that over 65% of students self-reported that they had used fallacious excuses. Earlier, Caron, et al. (3) had reported a 68% rate of fallacious excuses. Of greater significance, Caron, et al. (3) reported that over 90% of the time, faculty did not request or investigate evidence of these excuses. Ferrari, et al. (5), report that the primary purpose for fallacious excuses was to gain additional time to avoid or delay a task that was perceived as aversive. Ferrari, et al. (5) classified participants into two groups based upon the frequency of procrastination and found that academic procrastinators were significantly more likely to use fallacious excuses than non-procrastinators. Procrastinators most frequently used personal illness as the fraudulent excuse, whereas, non-procrastinators tended to use a family illness.

Ferrari, et al. (5) posit that the result of their evaluation may reflect "the students concern about the amount of time needed for a task, a characteristic of chronic, and perhaps, situational procrastinators." Logic would lead one to believe that, as academic maturity and the student's knowledge base expands, the "non-procrastinating" student would have a greater ability to estimate the time required for a task (5). Students with a small or limited knowledge base may also tend to underestimate time requirements. This is supported by Steel, et al. (14) findings that the level of procrastination is highest at the beginning of a semester and tends to wane as the semester progresses, e.g., the students

gain experience of an instructor's expectations over time. This "cramming" was empirically shown by Schouwenburg and Lay (12) where resistance to temptation increases dramatically over time until it reaches a maximum a few days prior to an examination. Solomon and Rothblum (13) further suggest that the time misperception is also inversely correlated with level of structure of the task, e.g., a lengthy and unstructured project, such as writing a term paper or designing a computer program, is more likely to generate a higher level of fictitious excuses.

Penalty Models for Encouraging On-Time Behavior

Student procrastination, under a variety of reward and penalty schemes, has been evaluated in many studies of self-paced or instructor-paced courses. Lamwers and Jazwinski (8) followed students in a self-paced course; each facing one of four course contingencies for failing to meet a deadline:

- "doomsday" (withdrawal from the course or failing grade)
- "doomsday" with tokens for early completion
- "contracting" (close instructor supervision and pacing)
- no contingencies (baseline).

Of these four plans, Lamwers and Jazwinski (8) found that contracting was the most effective method for reducing procrastination problems; however, it was the most costly to administer. The ideal situation, is to have a world in which all assignments that are late are disregarded—the "doomsday" scenario. This is a common real-world practice in government contracting, where a proposal is excluded from consideration even if it is submitted one minute after a fixed deadline, regardless of the circumstances. Although this approach clearly values and emphasizes the importance of on-time behavior, it is not practical in an unstructured academic setting. At the other extreme, the imposition of no deadlines at all fails to support the societal goal of timeliness, as well as failing to support the requirement of closure and performance measurement in an academic sense.

Anecdotal evidence suggests that the most common practice in academia is the "doomsday" with exceptions approach. In an unstructured academic setting, Ferrari, et al. (5) would posit that this approach would lead to a higher level of procrastination, hence, a higher level of fictitious excuse making. In the ideal world, the instructor would objectively evaluate each excuse and make a determination as to its validity. However, Caron, et al. (3) reported that faculty overwhelmingly do not request or evaluate evidence of these excuses. As such, this methodology is effectively "neutered" in general practice. We would suggest that the most common reason that excuses are not verified, is a result of the faculty's lack of time and/or aversion to having to deal with the administrative process in those cases where a student's excuse was found to be invalid. The failure of faculty to follow-up on excuses and the reasoning behind their decisions not to do so, would be a useful area for future study.

Another practice commonly used by faculty, particularly in Management Information Systems, is the penalty-per-day-late (PPDL) approach. In this scenario, a project is due at a time-certain; however, a fixed or proportional deduction is made for every day that the project is late. PPDL also features an ultimate "reckoning" date after which no projects will be accepted for credit. Most often, the reckoning date is that point where the penalty would make the project a guaranteed failure, say, after the maximum point value of the project after the penalty deduction would be less than 60%. PPDL forces students to evaluate whether the performance gain from the additional time outweighs the penalty imposed. For example, if a ten-point penalty is imposed for each day late, the student must assess if he/she can invest an addition 24 hours and gain more than the ten-point penalty.

Anecdotal evidence suggests that students rarely come out ahead in PPDL. Although not empirically supported here, this postulate is supported by the economic view of procrastination of Fischer (6) as well as the findings on performance shown by Steel, et al. (14). Although PPDL does minimize administrative recordkeeping, it still poses a challenge in what to do about excuses, in particular those that are tendered after the penalty period begins. One of the more common excuses heard by the authors in this situation is that the student had intended to start working on the project. The student indicates that he/she had chosen to go "home" for the weekend, had car trouble or had a sick relative that needed care, and was unable to get back on time to finish and turn the project in on Monday. One scenario often overlooked by many students is the hypothesis that work can actually be turned in or completed early. As suggested by Steel, et al. (14) and others, the intention of procrastinators may be to work hard and succeed, but they fail to do so.

EXPERIMENTAL REWARD SYSTEM FOR ON-TIME BEHAVIOR

This research posits that a positive reward system is more effective in encouraging on-time behavior than traditional penalty-oriented methods. Some detractors may express the sentiment that on-time behavior is a basic expectation and should not be rewarded. Other detractors posit that a reward system inherently inflates grades. However, in the business community, on-time behavior is recognized as a significant factor in the evaluation of employees , and as

such, is considered a virtue that is often rewarded with raises and promotions. Therefore, an effective positive reward system should:

- encourage students to manage their own time by shifting the locus of control from the instructor onto the student
- be easy for the instructor to administer
- be simple enough for the students to understand
- provide rewards with known value that have minimal impact on the distribution of grades or that do not cause "grade inflation"
- effectively reduce fictitious excuses that require subjective instructor evaluation
- minimize the delay in returning graded work to students, e.g. assignments from all students must be turned in before and graded results can be distributed.

Structure of Experimental Positive Reward System

A positive reward system was devised that allowed students to use a limited set of tokens to "buy time" against established deadlines for projects. The tokens were play money that could be exchanged for a one-day extension on a project. Students were instructed to endorse the back of the token as one would endorse a check. The appropriate number of tokens were attached to the late project. The students were given the option of redeeming from one to all of their tokens on any given project or saving them for a known reward at the end of the semester. Instructors were only required to track how many tokens had been used, thus meeting the objective of minimal recordkeeping.

A set of 95 college students from a southwestern university's business college was selected for the experiment. These students either completed the sophomore-level introductory applications development course or the senior-level entrepreneurship course. No students were enrolled in both courses simultaneously.

The rules for token redemption were reviewed with the students early in the semester and were included in each course syllabus. The rules are summarized in Table 1 below. The instructions to students clearly stated:

- total number of tokens available and what tokens can be used for
- what constitutes "one day"
- whether or not weekends count as one or two days
- the procedures for submitting late work (the 5-W's)
- how many tokens can be used on any one project
- what happens when all tokens have been redeemed
- the reward schema for unused tokens at the end of the semester.

Table 1 - Positive Reward System Experimental Summary

	Sophomore-Level Applications Development Course	Senior-Level Entrepreneurship Course
Number of students completing the course	64	31
Total Number of projects	5	7
Number of projects where tokens could be used	4*	6*
Token usage	Could use one or more of the remaining tokens on any project.	Could use one or more of the remaining tokens on any project.
Additional time allowed after tokens exhausted	Once tokens were exhausted, no late assignments would be accepted for credit.	Once tokens were exhausted, a penalty was assessed at 10% for every day late.
Reward schema	Two points were added to final exam grade for every unused token.	One point was added to final course grade for every unused token.
Group work restrictions	When working in groups, each individual group member was required to submit a token for each day late.	Group projects were not eligible for token usage.
Weekends count as how many tokens	2	1

*Tokens could not be used on the final project

Results

As shown in Table 2 below, token usage tended to increase as the subjects' grades decreased indicating a negative correlation between token usage and grades. Hence, those with higher grades tended to use the least tokens and those with the lowest grades tended to use all of their tokens. This was consistent for both the sophomore-level class as well as the senior-level class.

Table 2 – Token Usage by Final Grade

Final Grade*	Sophomore Avg. Tokens	Senior Avg. Tokens	Total Avg. Tokens
92-100	1.8	0.1	1.2
88-92	2.5	2.7	2.6
83-87	4.0	4.0	4.0
78-82	3.3	5.0	3.5
73-77	2.8	0.0**	2.8
68-72	5.0	0.0**	5.0
60-66	3.8	0.0**	3.8
Total	3.0	2.5	2.8

* Tokens used by failing students were not included since the number of observations was small and the students tended to drop the course or stop participating in class. Of those who dropped the course, most had expended all of their tokens before doing so.

** No student made below a 77.

The categorization shown in Table 2 was performed to test the hypothesis that students at the grade-margins would exhibit an atypical token usage behavior. The senior-level class had only two marginal areas—the 88(B)-92(A) range and the 78(C)-82(B) range. In both cases, the marginal students tended to use more tokens than those in the immediately higher grade range. For the sophomore-level course, the same pattern was exhibited, except at the C-B margin. In this atypical case, students were more likely to use the tokens to invest time in projects to achieve a higher grade. Although the number of attempts was relatively few, more often than not, these attempts were successful, thus somewhat inflating the average number of tokens used in the 83-87 range and deflating the number of tokens used at the margin. These findings tend to support the earlier findings of Steel, et al. (14) indicating that procrastination is an excellent and reliable predictor of performance, although some final-hour catching-up is possible.

As noted by Ferrari, et al. (5), academic procrastination tends to decline with age/maturity. This phenomenon was also present in this study where, as shown in Table 3, 64.1% of the students in the sophomore-level course used more than three tokens, whereas 54.8% in the senior-level course used more than three tokens. As such, one would posit that the reward system devised is more effective for courses where students tend to be less academically mature, e.g. freshmen and sophomores.

Table 3 – Token Usage by Procrastination Tendency

Token Usage*	Sophomore		Senior		Total	
	Subjects	Percent	Subjects	Percent	Subjects	Percent
Non-Procrastinators	23	35.9%	14	45.2%	37	38.9%
Procrastinators	41	64.1%	17	54.8%	58	61.1%
Total	64	100.0%	31	100.0%	95	100.0%

* Non-Procrastinators used less than three tokens. Procrastinators used three or more tokens.

Of greatest significance over the course of the semester studied, was that there was a virtual elimination of fictitious or undocumented excuses. Those few excuses that were received were for legitimate purposes and those

students were not required to expend tokens. In fact, two students attempted to redeem tokens even though they had legitimate excuses. At the same time, the unredeemed token reward offered at the end of the semester had no impact on the grade distribution in the senior-level class and relatively little impact on the grade distribution of the sophomore-level class (only two students moved up from a C to a B).

CONCLUSIONS

The findings of this study support previous research indicating that procrastination tends to decrease with academic maturity and that procrastination is a good predictor of performance. However, this study adds to previous research in finding that, a positive reward system requiring minimal recordkeeping, can reduce or eliminate the incidence of fallacious excuses normally encountered under penalty-based systems. Based on a post-experimental review of written faculty evaluations as well as informal discussions with the participants throughout the semester, the positive reward system was most often cited as allowing the students to better manage their own time. Thus, the reward schema was effective in shifting the time management burden, or locus of control, back onto the students where it belongs. A limitation of this research is that the students included in the study were not pre-tested for procrastination tendencies. Although this would have added additional validity to the experiment at hand, we would posit that the results of a pre-test would have added nothing significant to this study or built upon prior research in that, we would expect to find that procrastinators tend to have lower grades, tend to use more of their tokens, and tend to use tokens at a higher rate early in the semester. We would also expect that, once the students were aware of the nature of the experiment, that they may have adjusted their behavior accordingly.

An unexpected finding of this research was that those students with higher grades that actually used tokens did so to effectively "buy time" in another class. In a similar fashion to a penalty-per-day-late (PPDL) system, the positive reward system in this study indirectly gives the students an opportunity to take a penalty, or forgo a reward, in one class that can be offset by a gain in another class. As such, these students were effectively managing their time at a macro-level, whereas students with less academic maturity tended to manage their time at a micro-level. For example, a student may have a programming project due on the same day that they have a major accounting examination. By delaying the programming project for one day, the student buys 24 hours of additional time for the accounting test. This particular phenomenon raises the question of what would happen if a positive reward system were extended to encompass an entire college or university. In a similar vein, further research could be conducted from an economic perspective where students are allowed to exchange tokens with other students, hence, providing a fixed or free market for tokens.

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