Procrastination POLO

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Overview

Procrastination is a pervasive problem both inside and outside academia, incurring economic and personal costs that can often be easily avoided avoided. While in many cases, students seem to do well in spite of procrastination, the evidence suggests that even those not "at-risk," and perhaps even doing well by most standards, would significantly improve their academic outcomes if they could take measures against procrastinating.

This piece reviews the existing research on procrastination, focusing on two questions:

1. Why do we procrastinate?
2. What can we do to mitigate the costs of procrastination?

The basic picture that has emerged can be summarized by the following points:

• The tendency to procrastinate is normal, perhaps even innate
• Procrastination is distinguished from prioritization by irrationality. The former occurs when we put off a task on the basis of a plan to do it later that is unrealistic when later comes around, we put it off again.
• Beating procrastination is not necessarily about "doing it now." Instead, it's about taking measures to ensure plan follow-through when we do defer a task for a later time.
• Procrastination is more likely with long-term deadlines, i.e., large windows of time when a task could potentially be done

Some measures instructors can take to minimize procrastination tendencies are:

• Give frequent graded assignments evenly spaced throughout the semester
• For large assignments such as term papers, implement more frequent mandatory "check-ins," e.g., paper proposals and section drafts. For procrastination, what matters is the presence of hard deadlines.

Independently of course structure, some strategies students can use to mitigate procrastination are:

• Separate planning and execution
• Take frequent breaks: 5 minutes is enough to mitigate the effects of ego depletion. Coming back to a task (or decision regarding a task) after a break can reduce impulsivity.
• Eliminate distractions from your workspace
Track your time with tools like RescueTime
Consider using a commitment service such as BeeMinder

Introduction

As an instructor, a sure way to draw a murmur of complicit chuckles from your students is to assure them of your faith in their ability not to put off that big final project until the last moment. Neglecting work for longer than is prudent is typical, if not universal, of the student experience (Steel 2007; Laven 2007). And instructors are not immune to indulging in dilatory distractions either; William James once announced to a class:

I know a person who will poke the fire, set chairs straight, pick dust specks from the floor, arrange his table, snatch up a newspaper, take down any book which catches his eye, trim his nails, waste the morning anyhow, in short, and all without premeditation -- simply because the only thing he ought to attend to is the preparation of a noonday lesson in formal logic which he detests.

(William James, from Currey 2013)

While "procrastination" does have some negative connotations, on college campuses these tend to be more tongue-in-cheek. It is not without its bit of cachet: to say that one is procrastinating is part admission of guilt, solicitation for complicity, and sometimes part statement of identity. The fact that instructor and student alike joke about it suggests that procrastination is likely perceived not as the exceptional lapse in good planning, but as the rule for living a full campus life.

But this banality is also dangerous: it serves to justify and entrench a harmful -- if mildly so -- practice rather than to encourage reform. Ironically, procrastination has even been portrayed as beneficial for achievement: for every exhortation to "do it now," there is an equally vehement extollment of the virtues of procrastination -- how the mental faculties gain a preternatural clarity, invigorated with purpose, under the pressure of a deadline, so that only by putting off a task can the greatest effect be distilled from every drop of passing time. Researchers have argued that only "passive" procrastination is bad, whereas "active" procrastination is actually good and efficient (Chu and Choi 2005); along similar lines, "structured" procrastination turns the tendency to procrastinate to advantage by filling the time with useful tasks (Perry 1996). These ideas are common enough that it would be thoroughly unsurprising to find at one's local bookstore a book with the title The Procrastination Advantage.

What these rose-tinted views of procrastination tend to miss, however, is that procrastination is not simply delay, but irrational delay (e.g., Stroud 2010). Steel (2007) defines it as the voluntary delay of a task or action in spite of expecting to be worse off as a result. Another way to look at it: it is a delay predicated on false assumptions about future behavior, we put off exercise today by telling ourselves we will do it tomorrow, in spite of having little evidence to bolster our faith in our future muster.

Our concern here is with procrastination as irrational delay, the type often accompanied by regret and a litany of "if-only"s. "Good" procrastination (be it called structured or
active), is essentially no different from prudent prioritization. Irrational delays, on the other hand, are quite costly, disproportionately so to whatever benefits one might gain from them, so that in retrospect one wonders how one could have allowed such a lapse in judgment. Even taking regret out of it, students who procrastinate perform significantly worse than those who do not -- a finding upheld in both observational and experimental studies (see Steel 2007 for a survey). The effects are no less severe in non-academic settings: an H&R Block study found that procrastinating on taxes cost 40% of individuals, on average, $400 a year (Kasper 2004); procrastinating a critical screening can mean diagnosing a serious condition in later stages (White, Wearing, and Hill 1994). While we'll focus here on academic procrastination, the underlying ideas can be applied to (and are often draw from) a broader set of self-defeating behaviors.

Why do we procrastinate?

There are two basic sets of research findings on the determinants of procrastination. The first captures correlations between personality or task traits and observed (usually self-reported) procrastination behavior; the second studies the basic decision-making machinery that leads to seemingly irrationally costly delay, in the sense that the decision-maker himself often believes that the costs do not justify the benefits from delay.

Personality and task traits

Since procrastination behavior tends to be quite stable within individuals, a large portion of the procrastination literature is dedicated to discovering and documenting associated personality traits. This literature has furnished much of the popular wisdom on procrastination, e.g., it can stem from perfectionism, anxiety, and fear of failure. The range of personality constructs is quite broad, so we will follow the organization scheme developed in a recent meta-analysis (Steel 2007) and codified in a subsequent theoretical synthesis (Steel and König 2006; Steel 2011).

Psychological researchers have developed a diverse array of personality traits to describe differences between individuals -- perhaps the best-known of these is conscientiousness, which is highly predictive of broad measures of success and desirable behaviors. With respect to procrastination, many of these constructs have been correlated with self-reported procrastination behavior: neuroticism (e.g., Brown 1992; Burka and Yuen 1983; Ellis and Knaus 1977), agreeableness (Burka and Yuen 1983; Knaus 1979), impulsiveness (Blatt and Quinlan 1967), and conscientiousness (e.g., Silver and Sabini 1981; Kuhl 2000) -- each of which may be further broken down into more specific subcomponents. These will be reviewed in greater detail below.

On the other side of observational studies, researchers have examined task traits that are correlated with procrastination: tasks that are unappealing or found uninteresting are typically the ones delayed (Anderson 2001; Haycock 1993). More surprising is a more recent finding that people also procrastinate desirable activities when their potential time windows are large: for instance, people often procrastinate sightseeing in the city where
they live, or fail to use gift cards that do not expire (Shu and Gneezy 2010).

Steel (2011) organizes these situational traits into three broad categories:

- **Value**. Value is related to an individual’s attitude toward a task, e.g., if its completion will be viewed as particularly good or bad. In a sense, this is the "raw" utility a person would get from completing a given task.

- **Expectancy**. Expectancy is closely related to self-efficacy, self-esteem, and anxiety, in that it reflects an individual’s view of the relationship between present effort and future task-completion. This can roughly be viewed as a subjective probability of success.

- **Impulsiveness**. Impulsiveness captures how an individual weighs future payoffs relative to immediate ones. This captures individual-specific sensitivity to delay in rewards; it also partially includes related concepts, such as sensation-seeking.

None of these traits, however, directly leads to irrationality in decision-making. For instance, a low expected probability of task completion -- or low expectancy -- may lead to a perfectly rational choice not to complete the task since any investment of effort will likely be wasted, with no tangible benefit to show for it. Nor do any of the above directly explain why simple chores would be put off for long periods that clearly make a person unhappier. The irrational component requires a quirk in the way we experience time and measure future payoffs, which generates time inconsistency in our preferences.

**Time inconsistency**

Researchers address procrastination from many different angles -- clinical psychology, personality psychology, behavioral economics -- but there is general agreement that time inconsistency is at the heart of the phenomenon.

Coming back to the idea of irrationality: we may put off a task for any number of reasons, many of which may be legitimate and good -- after all, it is impossible to do everything now, or today. We may even put off a trivial task without violating rationality of for whatever reason we value very highly, in the present, doing absolutely nothing. What makes it irrational is when we create a plan that we should know will fail. For instance, when we delay our visit to the gym by creating an implicit plan to go the next day -- a plan that we fail to follow through with, even when nothing unexpected intervenes.

This failure is simply a consequence of the fact that now is always special, and we generally want to do pleasant things now and unpleasant things later. When making plans, however, we often fail to account for the fact that our future selves will view the future now specially as well, which may lead to the same type of reasoning by which we put off a task in the first place. Time-inconsistency in choice has been well-documented, and while there remains some debate over the exact mechanism (Read 2001), it is clear that our preferences are generally biased toward the present. Wertenbroch (1998) show that when asked to pick out movies in the future, people tend to select "high-brow" films that they think add value for having watched them (e.g., Schindler’s List), whereas in the
present people prefer "low-brow" films that are mostly comedic or entertaining, without providing any particular enrichment (think *Dumb and Dumberer*).

How this plays out in practice is that we will defer something for tomorrow, but then tomorrow undergo the exact same calculations that led us to defer today. For instance, when deciding when to go the gym, today may seem very unappealing, but we believe that tomorrow will find us newly invigorated. But when tomorrow comes, the gym may again seem especially tedious, especially when one might wait just another day, and so forth -- the irrationality comes from the fact that we keep committing ourselves to plans that we should know we will not actually follow up on.

**The procrastination equation**

The two basic themes that emerge from a multidisciplinary survey of procrastination are: (1) some form of time-inconsistency *universally* underlies the phenomenon of procrastination; and (2) the extent to which procrastination is realized in any given *instance* depends on both individual personality as well as task characteristics. A recent attempt to synthesize these findings into a single framework is Expectancy-Value Theory (Steel and König 2006), or more popularly as *The Procrastination Equation* (Steel 2011), which can be written:

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Utility = \frac{\text{Expectancy} \times \text{Value}}{\text{Impulsiveness} \times \text{Delay}}
\]

Hyperbolic discounting is in the form of the equation: the time delay enters into the denominator\(^1\). The other parameters are specific to the task and individual, which can change the degree to which a person will "undervalue" longer-term rewards in the present.

**Overcoming procrastination**

There are two significant divergences to note in the existing advice on procrastination. The first is that between researchers on procrastination and most existing popular advice. The latter comes mostly from a clinical perspective, which targets its advice on the management of personality traits associated with procrastination. For instance, a fairly comprehensive overview of advice offered on college campuses can be found with a simple google search for site:* .edu procrastination. Two words that will make any list are *anxiety* and *perfectionism*, along with a couple cursory exhortations to action in spite of possible imperfections. The main problem with this approach, however, is that personality traits are quite stable and difficult to change; moreover, since clinicians often see a biased subset of procrastinators (those concerned and motivated enough to seek

\(^1\)This form is often contrasted to the form of time discounting typically used in economic models, exponential discounting, where \(u(x,t) = \delta u(x)\) for some parameter \(\delta \in [0,1]\) to denote the level of impatience. This form does not generate time inconsistent preferences.
The advice that emerges from the disciplines of research has been less concerned with managing personality traits, focusing rather on specific actions an individual might take to temper the tendency to procrastination, whether by fostering automaticity, removing distractions, or enrolling in commitment devices.

The second divergence is within the research literature itself: while there is broad consensus on the causes of procrastination, and in particular on the role of time-inconsistency, there is less agreement on the most effective ways to address procrastination. The sections below overview the main types of recommendations offered by the literature. It should be mentioned while there is some disagreement over what works, the literature as a whole addresses the same basic problem: to find ways to reduce the tension between our present and future selves. The idea here is that decisions we make in the present concerning our future behavior should be binding in some way, so that our future selves do not have a chance to revise our presently well-laid plans and lead us into ruin.

**Commitment devices**

The idea of a commitment device is as old as antiquity. In Homer's *Odyssey*, Odysseus ordered his sailors to plug their ears with beeswax and to bind him tightly to the mast in order to hear the sirens' song. Anticipating the change of heart he would undergo upon hearing the song, he arranged affairs in such a way that it would be impossible for him to make decisions or issue new orders while he was under the sirens' spell.

While the distractions that divert us from our critical tasks are typically less dramatic, the basic idea remains the same: we may lay good plans for ourselves going forward, but when the time comes to execute those plans, we may experience a change of heart, and if it is too easy for us to change our minds at that time, then our plans are likely to remain unexecuted, to our detriment.

**In the classroom**

Ariely and Wertenbroch (2002) conducted two simple experiments to determine the extent to which people procrastinate and whether people would strategically set deadlines to counteract procrastination. Two sections of the same course were given different deadline structures for three papers: (1) *No choice*, where the deadlines were evenly spaced; and (2) *Free choice*, where on the first day of class students chose binding deadlines for themselves for each assignment. Students in the *No choice* group performed significantly better, both on the papers themselves as well as on an

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2 In fact, if anything, perfectionists as a population appear to procrastinate less than non-perfectionists (Steel 2007).

3 Missing the self-set deadline carried a score penalty. Papers were also all graded at the end of the course to mitigate feedback effects.
independent final project. Moreover, there was no significant difference between the No choice group and the subset of the Free choice group that chose evenly spaced deadlines.

The differences between groups amounted to about a third of a letter grade, e.g., the difference between an A- and a B+. A significant result in a classroom setting is quite striking: it shows that procrastination and suboptimal planning affects many students, not only the "problem" ones, and that outcomes can generally be uniformly improved with simple changes in a course's deadline structure.

When offered a commitment device, students use it to counteract procrastination, but do so at varying levels, perhaps because of differing levels of self-awareness or sophistication. Additionally, it seems that even sophisticated students do not use external commitment devices if none is offered as part of the task: in a second experiment, a group that was simply offered a late deadline did significantly worse on an incentivized proofreading task than those given the option to set their own deadlines. Even though nothing prevents students in the late deadline group from setting personal deadlines for themselves, they fail to do so when not offered an externally enforced commitment device.

In a different but related study, Fulton et al. (2013) found frequent deadlines to improve performance in an online setting -- here no commitment device. Basically, spreading out work seems to be good for learning outcomes, but is actually practiced by few students unless the graded assignments are structured in that way.

**Paying for it now, not later**

Economists have long studied a different type of incentive compatibility problem within firms that can shed some light on procrastination. For a large firm, the owners (represented by the board of directors) often hire somebody to make key strategic decisions (the CEO), whose personal interests may not always be the best interests of the owners. For instance, a CEO typically pursues the advancement of his own career, which would prioritize short-term returns over the long-term growth of the firm, since he will likely move on to other companies in the long-term. This may lead the CEO to take higher risks and be less sensitive to long-term effects than would be in the interest of the owners. Typical solutions to this type of problem, where parties with incompatible incentives rely on each others’ actions, are to write up contracts that align those incentives to the maximum amount possible. For instance, CEO compensation might take the form of stock options that cannot be executed until years after his term. Within the economics literature, these owner-executor problems are called principal-agent problems.

Procrastination can also be viewed as a principal-agent problem, albeit a slightly bizarre one in that the principal is the present self and the agent is the future self. In this case, the present self would like to create a plan executed by the future self, such as going to the gym tomorrow. The analog to writing a contract in this case is to specify rewards and costs to be dispensed conditional upon future actions. One way to do this, for instance, would be to increase the cost that is incurred if the plan is not carried out: the future self must go to the gym or pay out some large sum of money. This way, when the future self decides whether or not to go to the gym, he will need to weigh the experienced benefit of
delay against additional costs of deviating from pre-made plans.

Contracts of this form -- where there are no expected benefits, but only costs associated with not carrying out an action -- are called commitment devices. Rational decision-makers with no time-inconsistency problems would never pay to tie their hands in this manner, since limiting options should at best lead to the same outcomes. Experimental evidence confirms, however, that people often prefer to remove future choices, e.g., in a savings experiment, Beshears et al. (2011) found that people preferred the most illiquid commitment asset. Spurred by this research, there has grown a number of online services to offer generic commitment devices for all types of personal goals -- these are listed below in the "Additional Resources" section.

**Habit, or the virtuous monster**

That monster custom, who all sense doth eat  
Of habits devil, is angel yet in this:  
That to the use of actions fair and good  
He likewis gives a frock and livery  
That aptly is put on.  

-- Shakespeare's _Hamlet_

Another way to conceptualize the mechanism of precommitment is to think of it as a voluntary reduction of future agency rather than an increase in future costs. While the observed effects may be similar, most would find merit in the argument that there is a difference in the qualitative experience of the future self.

Many people develop habits that involve actions others would consider especially costly. Bad habits can incur high enough long-term costs that would dissuade most people from choosing the activities even once, e.g., drug addiction. Others develop "good habits" that allow them to seemingly ignore the costs that others would consider their most salient characteristics.

Consider, for instance, the habitual gym-goer. It is silly to imagine him entertaining the same vacillating calculations as the initiate: exercise is a part of daily or semi-daily routine, as natural as having lunch or brushing teeth. In a sense, it has become easier to go to the gym, but it is not necessarily that the costs or benefits have changed in any concrete way: there remain short-term costs and long-term gains. In these cases, sticking to plan happens not necessarily because the calculation has changed, but because a person, after performing a task with some regularity for some time, stops performing any calculation at all -- the action has become automatic, and the person does not experience it as a conscious choice to entertain or abstain in any given instance.

The mechanism that enables plan follow-through in this example is subtly but significantly different from that in the principal-agent contract solution. There, no matter what the principal self does, it is ultimately the future self that makes the decision of whether or not any plans laid out will be followed; hence, the best that the present self can do is to impose costs to deviating from present plans that will hopefully influence the decisions of
the future self -- the approach is to modify the *incentives* one faces in the future.

The underlying mechanism of the gym-goer example, however, is to cultivate the future self through habits and rules, i.e., to change the *preference* of the future self. In the principal-agent world, preferences of others are never directly alterable: someone prefers ice cream to gelato, and nothing can change that. In this context, the implicit constraint offered by such a model is that the future self will always inherently prefer delay to action. The only thing the principal can do is to alter the incentives so that the final realized *choice* is different. The intuition behind habit development, however, is that the future self grows out of the present, and so decisions that we undertake now may fundamentally change the values we use to make choice calculations in the future.

There is good reason to suppose that this type of "self-molding" consideration is almost certainly at work when we try to develop willpower or discipline in some aspect. Ainslie (2010) illustrates the point with a striking thought experiment:

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Imagine that you are trying to stop smoking, and an angel tells you that you will never smoke after today, whatever you do now. Do you smoke a cigarette now? (Why not?) Now, imagine that the angel says you will always smoke after today, whatever you do now. Do you smoke a cigarette today? (Again, why not?) These and other intuitions can be interpreted as demonstrating that the way you are motivated to forgo a current indulgence is by how it affects your expectation of your own future choices. (Ainslie 2010)

Ainslie argues that personal rules can be especially effective for addressing self-defeating behaviors. The pitfall in the case of procrastination, however, is that it is especially vulnerable to rationalization in ways that other types of behaviors are not. All decisions involve delaying *something*, so there are bright-line criteria for distinguishing self-defeating procrastination from prudent prioritization. Hence, special attention to motives and self-awareness are required for personal rules to effectively solve procrastination (Ainslie 2010).

Nevertheless, there is good evidence for the idea that making decisions automatic is effective for combatting procrastination. In a study of task traits, Silver (1974) finds that the number of "choice points", i.e., distinct times in a task where an individual needs to make a choice in order to continue, is highly predictive of task procrastination. This is also consistent with the psychological notion of "ego-depletion" (Baumeister 2002), which found that having people exercise willpower can lead to lower levels of subsequent willpower -- we can only reliably make a limited number of "good choices" in a day. Related studies on goal-achievement have shown that automaticity in decision-making is enormously beneficial (e.g., Gollwitzer and Baugh 2013), which may be due to its mitigation of extreme inefficiencies that can result from time-inconsistent preferences.

Cultivating willpower and self-control can be a generally difficult problem, but research has yielded several important insights into how people effectively resist temptations, including the temptation to procrastinate. Contrary to the intuition of many people, self-control is less about actively *resisting* temptation and more about *avoiding* it (Ridder et al. 2012). One way to avoid resisting temptation is to foster automaticity so that actions
are automatic. Most "productivity systems"\footnote{One examle is GTD: http://en.wikipedia.org/wiki/Getting_Things_Done}, for instance, separate planning from executing: planning can be made frequent (e.g., every morning) in order to allow for flexibility, but automaticity can be maintained by sticking to plan without reconsideration when executing the plan. But no matter how well-planned a day might be, people can experience the effects of ego depletion very quickly and remain unaware of its effects. For this reason, it is important to take short breaks -- even five minutes can significantly improve self-control and performance in subsequent tasks (Tice et al. 2007). Finally, as mentioned above, procrastination can be difficult to monitor, since it can be easily spun as rational delay, and also because most "temptation" activities occur in the same context as work activities -- on a computer. There exist several tools to improve monitoring of time spent, such as RescueTime, which runs in the background and logs time spent on different applications and websites.

Conclusion

Virtue consists, not in abstaining from vice, but in not desiring it
-- George Bernard Shaw

Procrastination may be commonplace, but it is by no means benign -- in spite of seemingly cogent arguments to the contrary, most students perform better when they are more constrained and their work is done at regular intervals, than when they are left with large assignments and longer deadlines.

This echoes work in psychology that documents the virtues of spaced study and testing: when students space out their study of material, their long-term retention is markedly improved (c.f., Bjork, Dunlosky, and Kornell 2013). In some ways, however, the problem of time-inconsistency is even more disturbing. The failure of many students to use proven study techniques is an error of ignorance, but the problem at the heart of procrastination is that they choose suboptimal plans despite their better judgment. The problem is so deep that we even fail to do things that are enjoyable when time horizons are long.

The good news is that one powerful solution is simple: beating time-inconsistency is all about precommitment. Since the problem is just that our future selves won't follow through with our excellent present selves' plans, if they don't have the opportunity to do otherwise, all will be well. And in fact, commitment devices have been shown effective at treating many procrastination-like problems, such as undersaving (e.g., Thaler and Benartzi 2004).

The not-so-good news is that as with all things simple in theory, the devil is in the details. In some ways, commitment devices are the flip side of rewards for good behavior, which work for some things, but not for others, especially when removed (see U. Gneezy, Meier, and Rey-Biel 2011 for an excellent overview). And some things that look like they should be commitment devices, such as announcing your intentions to others (so that the cost
paid upon not reaching the goal is the embarrassment of having a public failure), work in the opposite direction (Gollwitzer et al. 2009) -- people who announce their goals publicly actually have lower completion rates than those who do not, because goal announcement seems to consume part of the rewards of goal completion, a phenomenon known as *symbolic completion*.

Another more subtle issue is that, in theory, a commitment device is binary -- either the ability to make a future choice is removed or not -- but it is almost impossible to completely remove future decision-making power in practice. Most web-based services ask for a pledge amount that can vary, e.g., $5 or $50 for missing a daily or weekly goal. Unless the penalty is exorbitant, e.g., the entirety of one's savings, this type of system invites the consideration: "Is my present impulse worth $5?", to which the answer may very well be "yes." The research on ego depletion also suggests that the more choices we consider, the lower our ability to continue exercising willpower in decision-making.

"Beating procrastination" is often synonymous with "making good habits," something we all know is much easier said than done. In the short term, incentive manipulations of the sort offered by most web-based commitment services are helpful in nudging day-to-day decisions toward more prudent choices, and in some domains these short-term incentive manipulations can have long-lasting effects. From the other direction, the various components of habit development, whether personal rules or other forms of automaticity in decision-making, have been shown to help overcome procrastinatory tendencies. But putting theory into practice can be quite difficult, and there is no easy fix. While simple habits, such as brushing teeth, can be developed in as few as 21 days, more complex ones can take considerably longer to crystallize, sometimes over couple hundred days (Dean 2013).

Any solution to procrastination must deal, at some point, with strengthening willpower and discipline, which can be life-long endeavors. But the more we understand about ourselves and about why we procrastinate, the more tools we have to help us to achieve our goals. Commitment devices have been shown to help. They may be imperfect, but they've been shown to be an extremely useful tool that can be used to help achieve better outcomes, a second-best to help us abstain from vice when we've not yet reached the point of not desiring it.

**Additional Resources: CaaS**

A small list of websites that offer Commitment as a Service (CaaS):

- **BeeMinder**: Commitment device service that integrates with "quantified self" services, such as *RescueTime* (below). Participants pledge money, and goal verification is performed through external quantification services.

- **RescueTime**: Personal time-tracking service to monitor and report computer time use. User installs a program that runs in the background and monitors time spent on
websites and in certain applications.

- **StickK**: The "grand-daddy" of commitment device sites. Pledge money that goes to "anti-charities."
- **DietBet**: Commitment devices directed toward weight-loss. Users choose target weights and are assigned to peer groups. Each member contributes $20 to a common pool, which is divided between those who reach their goals.
- **Aherk**: Commitment device that posts embarrassing photos on Facebook.

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