Focusing As Commitment

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Abstract

The paper analyzes the decisions of a $\beta - \delta$ consumer who has the ability, through effort invested in focusing on the future, to set the exponential discount factor δ that will apply to her self in the next period. She has access to no other commitment technology. Because the model interprets dynamic inconsistency in a way that gives rise to the demand for costly self-control, it disambiguates the welfare benefit of formal commitment devices that limit future options. The model explains why cognitive loading is associated with impulsivity and why savings rates have exhibited increased income stratification since the 1980s. The model additionally offers a unifying theory of visionary leadership, managerial training, motivational speakers, and role models.

Keywords self-control; preference for commitment; time inconsistency; personal savings rate; cognitive bandwidth; visionary leadership; episodic future thinking.

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"Sire, remember the Athenians."

- words whispered by a servant in the ear of King Darius of Persia every night to maintain the king's resolve to avenge the destruction of the city of Sardis

"Even as I wander, I'm keeping you in sight. You're a candle in the window on a cold, dark winter's night."

- REO Speedwagon

1 Introduction

Evidence from psychological research indicates that focusing on the future reduces the discounting of future returns, particularly when combined with aids to visualization or imagination, such as episodic future thinking (Peters & Büchel 2010; Cheng et al. 2012; Daniel et al. 2013a, 2013b, 2015; Kaplan et al. 2016; Stein et al. 2016). It has also been shown that focusing increases success at tasks associated with a future orientation, including saving, dieting, reducing or quitting smoking, maintaining romantic relationships, and avoiding delinquent activities (Agnew et al. 1998; Benoit et al. 2011; Cheema & Bagchi 2011; Hershfield et al. 2011; Soman & Cheema 2011; Daniel et al. 2013b, 2015; Song et al. 2013; van Gelder et al. 2013; Kaplan et al. 2016; Stein et al. 2016; Green & Lynn 2017).

On the face of it, this evidence would appear to be well explained by a simple exponential discounting model in which discount rates are endogenous – and, in particular, a function of focusing or imagination effort (e.g., Becker & Mulligan 1997). The trouble is that nearly all the consumer problems for which focusing is demonstrably helpful are ones for which the challenge is not failure to sufficiently weight the future, but dynamic inconsistency. Would-be savers fail, despite an overwhelming desire to save, because of temptations to spend *now* that get in the way of longer-term intentions. Those wishing to lose weight start each day planning to stick to a diet program, but then deviate when a tempting dessert comes along or a hard day lessens their resolve. Smokers and other addicts intend to stay clean, but are triggered by environmental cues that compel them to use (Bernheim & Rangel 2004). Lovers (parents) treat their significant others (children) in ways that they regret, again despite best intentions; those wanting to start an exercise regimen never do so because it is always more attractive, when the moment to exercise

arrives, to postpone until tomorrow; and on and on. In all these cases, individuals behave in a way that their "long-run selves" do not appreciate (O'Donoghue & Rabin 1999).

This paper proposes a model of focusing as commitment. Agents in the model exhibit present bias as characterized by a quasi-hyperbolic $\beta - \delta$ discount structure (Phelps & Pollak 1968, Laibson 1997), whereby they may plan to execute a strategy to prepare for the future – such as, say, saving – but then fail to follow through. Agents therefore exhibit a demand for commitment.[1] The distinguishing feature of my framework is that the dynamic inconsistency of preferences is conceived as arising from a sort of "laziness" with respect to long-term intertemporal values. Priorities that are not kept "front and center" in one's mind cease to be salient, causing the individual to fall prey to present-centered impulses. Focusing effort, directed at a future object, may therefore be used by the individual to bring her values back into focus so that they *feel* important and actionable at the relevant decision moment. Because the failure to keep a future object top-of-mind is treatable, individuals are not properly myopic, but *amblyopic*.[2]

I develop a parsimonious representation of amblyopia via a simple extension of Laibson's (1997) framework for intertemporal decision-making with hyperbolic discounting. The consumer in my model focuses in the present to influence her next-period self's exponential discount factor δ applied to future periods – in doing so, she in effect sets that discount factor. Each new period the "laziness" returns, and the consumer must again focus to set the discount factor for her *next*-period's self. My model shows that – for an amblyopic consumer – focusing serves as a form of commitment, such that it can effectively take the place of the illiquid asset (i.e., golden eggs) instrument.

An essential and novel recognition in this effort is that the problem of commitment is, broadly and at heart, a salience problem. If temptations in the present derail the individual from accomplishing what she had previously set out to achieve, it is invariably because those temptations impose themselves on her consciousness in that moment. The commitment problem so construed may solved in one of two ways. It may be solved by limiting the response to the salient temptation – either physically, or through psychological incentives. This is the means described in much of the existing literature (e.g., Laibson 1997, Bénabou & Tirole 2004). But it may also be solved by making salient for

[1] There is substantial evidence that discount functions are approximately hyperbolic (Ainslie 1992, 2005).

[2] Gabaix & Laibson (2017) conceive of a myopic consumer who discounts the future because he does not see it clearly. In their model, hyperbolic discounting emerges, but – unlike my model – the consumer has no taste for commitment.

the future self at the moment of action the desirability of the object that is salient to the present self. One can, so to speak, either bind Odysseus to the mast, or else induce him to be so completely focused on reaching his destination that he doesn't heed the sirens. Notably, in "focusing," my theory conceives of a cognitive activity that effectively influences the individual's valuation of a future action while providing neither new information nor being – in any conventional sense – persuasive about the value of the action.

The focusing model offers several important contributions. It provides for a "hot-state" (or, rather, lazy-state) interpretation of hyperbolic discounting that naturally gives rise to a demand for costly self-control; thus it offers a clear basis for evaluating the welfare effect of hard commitments that limit options ex ante. It offers an explanation of why cognitive loading is associated with impulsivity. Relatedly, it explains the increasingly stratified pattern of savings rates observed in the U.S. since the 1980s: as access to instant credit eliminated implicit commitment opportunities, people with low cognitive loading maintained commitment through focusing effort while others failed to do so. It thereby enables the extension of Laibson's (1997) welfare framing of the excess liquidity problem to formalize the notion that excess liquidity disproportionately harms the poor. Finally, in recognizing focusing as commitment, the framework makes evident that a range of phenomena – motivational speakers, self-help books, managerial training, evangelical pastors, visionary leaders, role models, and others – represent extrinsic aids to commitment.

After discussing related literature in the rest of this section, I detail in Section 2 two extended examples illustrating the use of focusing effort to foster commitment in the real world. These examples provide evidence that is consistent with my conception of an amblyopic consumer; importantly, the examples strongly suggest that focusing can only be effectively understood in the context of a hyperbolic discounting framework. Section 3 presents the model. Section 4 analyzes its equilibrium. Section 5 discusses key implications of the model. Section 6 explores extrinsic aids to commitment. Section 7 concludes the paper. All proofs are contained in the Appendix.

1.1 Related Literature

Two approaches to commitment are distinguished in existing work[3]: hard commitments, involving real economic incentives to comply or externally binding constraints; and soft

[3]See Bryan et al. (2010) for a recent survey.

commitments, which are built mainly on psychological incentives for compliance.

The economic literature on soft commitment, into which the current paper fits, identifies several behaviors that serve a commitment purpose, including: self-signaling resolve by adherence to personal rules (Bénabou & Tirole 2004), maintaining motivation through self-confidence (Bénabou & Tirole 2002), and thwarting future undesired behavior through strategic ignorance (Carrillo & Mariotti 2000). Relatedly, Bernheim & Rangel (2004) develop a cue-based theory of addiction according to which the presence of certain environmental cues cause individuals to enter a "hot" state in which they are more prone to give in to the temptation to use. Cue avoidance flows naturally from this framework as a soft commitment strategy, and indeed addicts recognize their susceptibility and practice cue avoidance with some degree of sophistication (Bernheim & Rangel 2004, p1559).

None of the papers in this literature explicitly address the possibility of focusing on a desired object as a commitment device. Ainslie (1992) examines how directing one's attention *away* from sources of temptation (i.e., repression or suppression) may aid commitment; he does not address efforts to focus toward desired objectives. His analysis is therefore more properly viewed in connection with Carrillo & Mariotti (2000) and Bernheim & Rangel (2004).

The most closely-related discussion is offered by Boyer (2008) on what he terms "mental time travel" (MTT) – the ability to re-experience situations previously encountered, or to vividly conceive of future situations.[4] Boyer posits that MTT functions as a defensive internal mechanism for addressing impulsiveness in situations in which no external commitment devices are available. Particularly notable in light of the current work is his idea that MTT functions as a "calibration device" by generating emotional rewards in the present that are "immediate and, therefore, bypass the usual discounting of future consequences of actions (p221)." In support of this proposed mechanism, Boyer points to evidence that amnesiac patients, who would not have the capacity for MTT, are more susceptible to tempting but self-defeating strategies (Gutbrod et al. 2006).

In contrast with my conception, Boyer conceives of MTT as consisting of *involuntary*, primarily negative recollections or visions that act as an automatic restraint on impulsive choices. This notion is more in line with Frank's (1987) analysis of "conscience" – the spontaneous experience of crushing guilt that protects the individual's long-term interests by tripping up self-serving impulses deleterious to pro-relationship goals – than it is with

[4]For the originating discussion of MTT, see Suddendorf & Corballis (2007).

the *discretionary* notion of focusing I deal with here.

Recent work by Laibson (2015) has suggested that, despite theoretical indications that dynamically inconsistent preferences engender a demand for commitment, very little hard commitment is actually observed in the economy – in part because such commitments are costly. For this reason among others, focusing effort and other soft commitments may have substantial real-world relevance.

2 Focusing Effort: Real-world Examples

2.1 Cognitive Therapies for Substance Addiction

In their paper on addiction, Bernheim & Rangel (2004) offer extensive evidence that substance use by addicts is frequently a mistake rather than an intentional act. The substance addict faces heightened susceptibility to mistaken use based on environmental cues that are to some degree predictable. A smoker knows that being around friends who smoke will trigger her. A heroin addict knows that a return to a location where previous use took place will cue repeat consumption.

Addicts are often sophisticated about their triggers and employ a range of commitment devices to manage their susceptibilities. These include hard commitments, such as "lock-up" rehabilitation facilities and medications that produce unpleasant side effects if the substance is later consumed. Among other strategies employed, Bernheim & Rangel reference *cognitive therapies*, which "teach cue-management, which entails refocusing attention on alternative consequences and objectives, often with the assistance of a mentor or trusted friend or through a meditative activity such as prayer. Notably, these therapeutic strategies affect addicts' choices *without providing new information* (p1561, emphasis from source text)." Descriptions of cognitive therapies for addiction from other sources detail the playing out of episodic scenarios that demonstrate to addicts how their actions at critical moments can change outcomes (e.g., Carroll et al. 2008).

Three elements of these accounts are critical. First, the behavioral responses occur in the context of, and are intended to anticipate and address, a recognized problem of dynamic inconsistency. Second, addicts engage in therapy-as-preparation: they act now to ready themselves to encounter and deal effectively with a future problematic situation. Third, both the therapy and the learned cognitive approaches to dealing with cues make use of episodic future thinking. As such, they represent the application of focusing effort

aimed at reducing discounting of the future.[5]

2.2 Strategies for Personal and Professional Challenges

In his book, *The 7 Habits of Highly Effective People*, Stephen R. Covey (1989) introduces as his second habit a strategy for what he calls "personal leadership": "Begin with the end in mind." The core idea is that one should develop a cohesive vision as to what one is going to do in life, aligned with one's values. Then one should live while maintaining focus on that vision. As Covey explains: "Personal leadership is not a singular experience. It doesn't begin and end with the writing of a personal mission statement. It is, rather, the ongoing process of *keeping your vision and values before you* and aligning your life to be congruent with those most important things (p132, emphasis added)."

Covey illustrates the application of this process with an example. A parent loves his children, but has trouble overreacting to them on a daily basis. To solve this problem, the parent writes an affirmation that lays out in personal, visual and emotional terms the principles according to which he would prefer to respond to his children in the context of the specific triggering situation. He then engages in vividly visualizing an application of the principles in his affirmation:

> I can spend a few minutes each day and totally relax my mind and body. I can think about situations in which my children might misbehave. I can visualize them in rich detail. I can feel the texture of the chair I might be sitting on, the floor under my feet, the sweater I'm wearing. I can see the dress my daughter has on, the expression on her face.... Then I can see her do something very specific which normally makes my heart pound and my temper start to flare. But instead of seeing my normal response, I can see myself handle the situation with all the love, the power, the self-control I have captured in my affirmation.... And if I do this, day after day my behavior will change.

Covey's process comprises the same three key elements as Bernheim & Rangel's (2004) cognitive therapies for substance addiction. First, the problem addressed is one of dynamic inconsistency: one has intentions to be a good parent, but finds that one's "future

[5]Other soft commitment devices are almost certainly at work. The fact that cue-triggered recidivism is characteristic of addiction (e.g., Bernheim & Rangel 2004, p1560) implies that behaviors create precedents. This suggests that personal rules and willpower (Bénabou & Tirole 2004) and endogenous self-confidence (Bénabou & Tirole 2002) likely play a role in efforts to remain clean and sober.

self" stubbornly overreacts. Second, the individual prepares himself *in advance* to deal with a future problematic situation. Third, the preparation and execution – and, in particular, the affirmation that is employed in both – involve focusing effort (i.e., episodic future thinking). These activities – in making long-run values salient – reduce discounting of the future.

The elements at the center of Covey's advice on personal leadership appear similarly in self-help books and training curricula aimed at developing organizational leadership skills. As one example: a leadership training program at a Fortune 500 pharmaceutical company advises trainees to maintain focus on their priorities when faced with personal "triggers." In other words, the individual should strive to recognize what work situations may trigger her to respond in a way that is inconsistent with her preferred behavior. She should develop a clear and visual sense of her priorities – as a person and as a manager – and learn to focus on these. Then, when the triggering moment arises, she evokes and sustains the learned focus in order to resist her "triggers" and maintain behavior in alignment with her long-run values.

3 Model

I assume a consumer who must make consumption and savings decisons over a finite horizon in discrete time $t \in \{1, 2, \ldots, T\}$. Consumers exhibit quasi-hyperbolic "$\beta - \delta$" discounting, and thus face an ongoing problem of present bias. The consumer has only one savings instrument available to her, a liquid asset x. There are no illiquid assets. However, the consumer has the ability to engage in focusing effort, which has the effect of lowering her δ in the next period.

Every time period is divided into four subperiods. In the first subperiod, the consumer's savings x_{t-1} yield a return of $R_t = 1 + r_t$. In the second subperiod, the consumer earns labor income y_t and gets access to her savings, $R_t \cdot x_{t-1}$. In the third subperiod the consumer chooses her current consumption, $c_t \leq y_t + R_t x_{t-1}$. What she does not consume, she saves, thus

$$y_t + R_t x_{t-1} - c_t = x_t$$

where $c_t \leq y_t + R_t x_{t-1}$ ensures $x_t \geq 0$. This constraint rules out forced savings contracts (Laibson 1997). In the fourth subperiod, the consumer chooses how much to focus on the future; this activity serves to set the discount factor, δ_t, that will influence her at $t + 1$

when she makes her consumption and savings decisions in that period. The consumer begins life with exogenous endowments $x_0 \geq 0, \delta_0 \in [0,1]$.

The essential assumption of amblyopia is a dichotomy in the discount factor, δ. We conceive of δ_0 - the endowed discount factor - as embodying the consumer's underlying intertemporal preference, which is fixed. The setting of $\delta_t \geq \delta_0$, by contrast, represents a temporary increase in the salience of future consumption. It does not alter the consumer's preference for future consumption per se, so much as it enables the consumer to act more effectively pursuant to her underlying preference. Thus, while we will think of δ_t as applying to the consumption and saving decision for the consumer t, it will not apply to the consumer's subsequent choice of δ_{t+1}. This choice is made by the consumer with reference to her fixed intertemporal preference δ_0.

Focusing effort and imagination are necessarily object-specific. A consumer focuses on saving for college, for example, or for a house. So the decrease in discounting that occurs with focus accrues to the object of the focus. But the individual's consumption and saving decision is always whether to consume now versus in the future. Thus the focused-on object, as a salient item, becomes effectively a stand-in for the individual's future consumption more broadly, whence the decisions made based on the salient object influence the general tilt of consumption toward the future. For this reason, the model represents focusing as a general reduction in the discount rate of the relevant period.

The consumer faces a time-additive utility function U_t of the form proposed by Laibson (1997):

$$U_t = u(c_t) + \beta \sum_{\tau=1}^{T-t} \delta^{\tau} u(c_{t+\tau}) \tag{1}$$

In view of the dichotomy between the consumer's functional discount factor - based on salience of the future - and her permanent preference for future consumption, the parameter δ in (1) takes different values depending upon the decision the consumer is making. When she chooses consumption and saving, she maximizes the following utility function:

$$U_t = u(c_t) + \beta \sum_{\tau=1}^{T-t} \delta_{t-1}^{\tau} u(c_{t+\tau})$$

Thus she makes her consumption and savings decisions following the relative weighting of different periods imposed on her by the focusing effort she engaged in the previous period.

In contrast, when she sets the discount rate, she does so subject to the "permanent" utility,

$$U_t = u(c_t) + \beta \sum_{\tau=1}^{T-t} \delta_0^\tau u(c_{t+\tau}) \tag{2}$$

based on her endowed discount rate δ_0.

The utility function in (1) represents dynamically inconsistent preferences. Consistent with Pollak (1968), Peleg & Yaari (1973), Goldman (1980), and Laibson (1997), I model the consumer as a sequence of temporal selves making choices in a dynamic game with their future selves. Hence, a T-period consumption problem is represented by a T-period game, with T players ("selves") indexed by their respective periods of control over the consumption, saving, and focusing decisions. I seek subgame perfect equilibrium (SPE) strategies of this game.

I adopt similar notation to Laibson (1997). Additionally, I adopt Laibson's restriction on labor income, given by

$$u'(y_t) \geq \beta \delta_0^\tau \left(\prod_{t=1}^{\tau} R_{t+i} \right) u'(y_{t+\tau}) \tag{3}$$

which allows marginal conditions to be used to characterize the equilibrium strategies.

We will say that a sequence of feasible consumption/savings/focusing actions, $\{c_{\hat{t}}, x_{\hat{t}}, \delta_{\hat{t}}, \ldots, c_T, x_T, \delta_T\}$ satisfies C1-C5 if $\forall t \geq \hat{t}$,

C1 $u'(c_t) \geq \max\limits_{\tau \in \{1,\ldots,T-t\}} \beta \delta_{t-1}^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i} \right) u'(c_{t+\tau})$

C2 $u'(c_t) > \max\limits_{\tau \in \{1,\ldots,T-t\}} \beta \delta_{t-1}^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i} \right) u'(c_{t+\tau}) \Rightarrow c_t = y_t + R_t x_{t-1}$

C3 $u'(c_{t+1}) \geq \max\limits_{\tau \in \{1,\ldots,T-t-1\}} \delta_0^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i} \right) u'(c_{t+1+\tau})$

C4 $u'(c_{t+1}) > \max\limits_{\tau \in \{1,\ldots,T-t-1\}} \delta_0^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i} \right) u'(c_{t+1+\tau}) \Rightarrow c_{t+1} = y_{t+1} + R_{t+1} x_t$

C5 $\delta_0 \leq \delta_t \leq \frac{\delta_0}{\beta}$

It is now possible to state the main theorem of this paper:

Theorem 1. *Fix any T-period consumption game with exogenous variables satisfying* (3). *There exists a unique resource-exhausting joint strategy, $s^* \in S$, that satisfies C1-C5, and this strategy is the unique subgame perfect equilibrium strategy of this game.*

4 Analysis of Equilibrium

The theorem shows that focusing effort arises as a commitment device in equilibrium in any state (i.e., for all feasible values of exogenous variables) in which the consumer would have invested in the illiquid asset had it been available. Several characteristics of this equilibrium are notable.

Property C5 specifies that δ_t, as set in period t, will fall within a prescribed range: it will be no less than the endowed discount factor δ_0 representing the consumer's fixed, underlying intertemporal preference, and no more than the value that would completely neutralize the consumer's present bias for the relevant period $t+1$. It is important to recognize that focusing in equilibrium does not per se eliminate present bias. Rather, it makes the future sufficiently salient to render the present bias inconsequential, but no more. In general, if the consumer at t were to set $\delta_t = \frac{\delta_0}{\beta}$, she would be setting the relative weight between $t+1$ and $t+2$ correctly, viewed in isolation. But she would be overweighting periods beyond $t+2$ and so cause over-saving and under-consumption in t. Her choice of δ_t balances weight on the future against weight on the present in such as a way that C3 and C4 are met.

Note that the *consequentiality* of the present bias is dependent upon – and, in fact, defined as – whether an agent playing the game in which the illiquid asset is available (i.e., the game in Laibson (1997)) would choose a positive quantity of it. If there is not a positive quantity chosen in equilibrium in that game, then neither will the agent who finds the illiquid asset not available choose to reduce her discount rate δ_t. Note also in view of C5 that $\delta_t > 1$ is theoretically possible. That is, the consumer at t might induce the consumer at $t+1$ to place relatively greater weight on successive periods beyond the next period. This result is consistent with the possibilities that obtain in Becker & Mulligan (1997).

Finally, the model shows that focusing may be a more effective form of commitment than an illiquid asset under certain parameter values. Given the constraint of $x = 0$ (Laibson's P3), the $t+1$ self cannot always be forced to comply with the consumer at t's preferred consumption agenda. Meanwhile, focusing achieves compliance consistently

via the optimal choice of δ_t.

5 Implications of the Model

I now consider a number of implications of the focusing model. All of these flow from the model with the additional recognition that cognitive effort – such as is required to focus on the future – is a scarce resource, hence costly. The implications generally depend upon the more specific assumption that the costliness of focusing is a monotonic function of the reduction in the exponential discount factor, δ.

5.1 Costly Self-Control and the Welfare Effect of Hard Commitments

The focusing model remedies a weakness in the hyperbolic discounting commitment framework identified by Gul & Pesendorfer (2001) (henceforth "GP") – that the welfare effect of a policy that enforces a hard commitment – that is, that removes available options – is generally ambiguous under such a framework.

The focusing model conceives of hyperbolic discounting as arising out of amblyopia – a chronic failure to experience future events as salient. As such, my framework recognizes focusing as an advance preparation that individuals can take to remedy their amblyopia when other forms of commitment fail to constrain their options. In view of its being imposed in advance, focusing would be distinguished by GP as commitment rather than self-control; yet in a cost sense it behaves much the same as GP's temptation cost, in that the costs associated with focusing rise with the seriousness of the threat that it is intended to address.

Intuitively, focusing functions like a levee: the individual must invest in protection sufficient to withstand the temptation that is anticipated to loom large in the present moment. Assuming the cost of that protection is nontrivial, it is the case, as in GP, that the individual would prefer not to have a tempting item on the menu even if it is not chosen in equilibrium. Having it on the menu – so long as it is sufficiently tempting – necessitates the construction of the levee. With it off the menu, the levee is unnecessary and the cost of construction is avoided. This implies clear welfare consequences for focusing – and an unambiguous welfare benefit to hard commitments that alleviate the need to focus – in a fashion that parallels the GP model.

Note that a distinction between the focusing model and the GP model is that in the focusing model items on the menu impose a self-control cost only if they reach a threshold for requiring cognitive action to avoid the temptation – that is, if the present bias achieves consequentiality. In the GP model, the most tempting item on the menu always imposes a cost. Introspection suggests the threshold characteristic is more realistic: not every stimulus in the environment is sufficiently salient to call attention to itself. This suggests that the welfare benefits of hard commitment indicated by the GP model may be overstated.

A further advantage of the focusing model, relative to GP, is that it gives a concrete psychological conception to self-control costs that is based on evidence from the literature. That evidence indicates that the efforts that shift decisions away from temptations almost invariably involve so-called mental time travel. This realization reinforces, inter alia, the appropriateness of a hyperbolic discounting model of self-control.

5.2 Cognitive Load and Impulsivity

The focusing model may be the key to understanding why cognitive load results in greater impulsivity. In a famous experiment, Shiv & Fedorikhin (1999) show that, all else equal, cognitively-loaded individuals are more likely to choose chocolate cake as a snack – an impulsive choice – in preference to a healthier option of fresh fruit.[6] The authors characterize this finding as indicating that limitations in processing resources cause individuals to default to an automatic, affect-driven choice process, whereas they would otherwise rely on a more controlled process that results in cognitions about the consequences of different choices.

The focusing model sharpens the description of this process around its rational-choice components. The "automatic" affect-driven process treats the present moment as primary, in effect placing greater weight on the present and discounting the future. In contrast, considering consequences brings the future into greater focus, reducing the discount factor applied to that future. This explanation is aligned with the psychological evidence, cited in the introduction, that focusing effort both reduces discounting and ensures success at future-oriented behaviors. Put in the parlance of the model, cognitive load interferes with the amblyopic individual's ability to engage in focusing effort, such she fails to align

[6] von Hippel & Gonsalkorale (2005) make similar findings, showing that participants under cognitive load are more likely to blurt out an inappropriate and negative response in situations that evoke such affect. Individuals not so loaded exhibit greater inhibitory function.

her discount rate with her true values concerning future consumption. Her regard for the future remains "lazy," and so she acts on her impulses.

5.3 The Stratification of Declining Savings Since the 1980s

In demonstrating that focusing effort substitutes for illiquid assets as a commitment device, the focusing model may help to explain why cognitive loading is associated with debt, and relatedly why the period beginning with the 1980s saw not just a reduction in savings rates but an increased stratification in savings rates by income level. Laibson (1997) argues that the availability of instantaneous credit led to a decline in savings rates in the U.S. during the 1980s. In particular, he points to data showing a precipitous drop in U.S. personal savings as a percent of disposable income between the 30-year period leading up to 1984, and the 10-year period that followed. Laibson reasons that instantaneous credit represented an opportunity to borrow against illiquid assets; it thereby reduced their effectiveness as a commitment device.

But what happened during the relevant period went beyond a simple decline in savings across all consumers. Savings data for the period 1978 to 2007 from the Distributional National Accounts and Congressional Budget Office show that the top 1% of the income distribution actually increased their savings modestly, while for the next 9% savings essentially held steady. It is only the lowest 90% who experienced substantial dissaving during the period (Mian et al. 2021).[7]

One possible explanation is as follows. With illiquid assets becoming increasingly ineffective, consumers during the 1980s were forced to fall back on focusing as commitment. Those consumers with cognitive resources to spare – mainly the rich – mustered the wherewithal to maintain commitment through focus and continued to save. Meanwhile, the poor, who have always been cognitively taxed, did not have the "bandwidth" resources to devote to focusing effort, and so fell prey to access to instant credit disproportionately. Thus we observe not only a declining general rate of saving, but an increased stratification of this decline after credit cards became widely available.

[7]The same sectoral trends are observed when one looks at the period only up through the publication date of Laibson's paper in 1997.

6 Extrinsic Aids to Commitment

> "If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea."
>
> - Antoine de Saint-Exupery

So far, I have treated focusing as an isolated decision by an individual to make use of what is in effect an endowed personal commitment resource. This is not a wholly adequate characterization for two reasons.

First, as discussed above, focusing is likely costly in that it utilizes a scarce resource. The efficiency with which individuals may engage in it likely varies from person to person and, for a given person, from moment to moment. It follows that there conceivably exist more efficient ways to obtain focus than simply doing it based on one's native resources at a particular moment. If that is true, then individuals will typically demand access to external "technologies" of focusing. These technologies may take the form of services offered by people, for whom focusing efficiently or the ability to motivate is an element of their human capital. They may also include media that provide focusing "know-how" or motivation.

Second, much as Benabou and Tirole (2002, p873) have noted that various people may have a vested interest in an individual's self-confidence, so too is it true that individuals and organizations will more broadly have a vested interest in an individual's commitment. These principals will, in relevant situations, have an incentive to build up the individual's ability at focusing. Their manipulations may take various forms, many of which are readily recognizable in common institutions and other familiar phenomena.

Below, I offer several examples of extrinsic aids to commitment – such as may be sought by a decision maker as useful technology, or imposed on a decision-making agent by a principal with a vested interest. All involve, in effect, applied focusing effort.[8]

6.1 Visionary Leadership

The fact that successful commitment leads individuals to follow through on relevant actions over the long term means that organizations will frequently find themselves in the

[8] Managerial training and self-help books represent additional examples. See Section 2.2.

position of wanting to inspire their employees with increased powers of focus. An important manifestation of this is leadership in organizations. In particular, one often hears the term "visionary leadership," or hears about special leaders – particularly company founders – who had extraordinary vision. But what is visionary leadership? And what, for that matter, is meant by "vision," when referenced in the context of leadership?

The focusing model suggests that it is not in the ideas. Individuals may have remarkable ideas, but that does not make them leaders. Rather, vision as relates to leadership consists in the ability to impel commitment to a course of action. The skills of the visionary are precisely in the ability to reduce the applied discount factor of one's followers. Thinking of an overarching theme with respect to a course of action is not critical to the success of the action; committing people to the action dynamically is.

The model thus provides a rational-agent account of why leaders are valued for their "vision." Rather than relating to a far-fetched expectation that some people have superior or even supernatural powers to predict the future, the model suggests successful leaders merely possess above-average powers of commitment, paired with the ability to inspire similar commitment in others.

The model suggests that those least adept at focusing are the most dependent on the visionary services of leadership. Adept focusers, whether they are skilled at inspiring focus in others or not, are more likely to succeed at commitment-oriented tasks without being led. Thus organizations will tend to allocate visionary leaders to workgroups based on where their focus is most needed. And they will tend to allocate employees to bosses and workgroups based, in part, on who stands to gain the most (i.e., in productivity) from the scarce commitment services of skilled visionary leaders.

6.2 Motivational Speakers

The model provides an explanation of why we observe demand for financial gurus, evangelical pastors, and other motivational speakers (such as TED presenters) – even when such people provide no new *information* on the value, respectively, of saving money, attaining salvation, and pursuing other aspirational goals. Rather than being the most knowledgeable about some area, the most effective members of these groups are the most "visionary" – which is to say, the most able to motivate sustained focus and inspire commitment in others.

The fact that people are often willing to pay for the services provided by these people

provides some sense of the economic value of the commitment that focusing provides.

6.3 Role Models

In their motivational theory of role models, Morgenroth et al. (2015) describe role models as "representations of the possible." As such, the individuals in question do not show *how* to do something, but rather *that* something is possible (p3).

This particular function of role models mirrors in its effects on an individual's prospective actions the role of episodic future thinking about those same actions: the role model with whom one identifies and to whose achievements one aspires becomes a vivid and dynamic representation of one's own desired future. In doing this, the role model reduces the individual's discount rate with respect to future goals that align with the role model's achievements. Viewed through the lens of the focusing model, then, the role model offers an extrinsic aid to commitment.[9]

Role modeling can play a similar role in group activities. A runner motivates herself by running with others. The motivation arises in part because the other runners - assuming the runner chooses her running buddies wisely - provide visual role models who persevere and run hard, reminding of her of her core values in the running and challenging her to do as they do.

7 Conclusion

This paper has demonstrated that focusing effort serves as a commitment device. I have outlined several contributions of the focusing framework and have offered some examples of the focusing mechanism in action in the guise of real-world phenomena.

Focusing may largely be the commitment device of well-to-do. If one is fortunate enough to have the cognitive bandwidth to devote to focusing on the future – or if one is able to hire a servant to whisper in one's ear, as did King Darius of Persia – one may fare better at resisting temptations, saving one's money, and so on. The financial reforms that began in the 1980s and have continued to this day have, in weakening essential sources of hard commitment – as noted by Laibson (1997) – have made consumers increasingly dependent on extrinsic aids to commitment, such as those discussed in Section 6. Indeed, the proliferation of audiobooks and podcasts by financial gurus who claim the unique

[9]For an economic study demonstrating the effects of role models, see Porter & Serra (2020).

ability to help people get on a secure financial path may be a direct outcome of the financial reforms – not because those reforms have made more financial options available, but precisely because they have rendered certain previously existing financial options impotent.

To be sure, there is a certain romance in the "commitment the hard way" that focusing effort represents. Pining for one's beloved is a centuries-old ritual for maintaining commitment in long-distance relationships.[10] Similarly, the obsessive spirit of King Darius – or, for that matter, Inigo Montoya in *The Princess Bride* – earns a certain reverence. That said, as discussed earlier in this paper, a key use of observations both of focusing effort and of the employment of aids to that effort is the measurement of the opportunity cost – in terms of money, time, and effort – of the counterfactual availability of formal commitment devices.

A Appendix

The proof of my Theorem 1 takes as its starting point Laibson's (1997) Theorem 1. The proof involves demonstrating that a translation of Laibson's result applies to the T-period game I describe in my theorem.

Three preliminary lemmas are required to complete the proof.

Lemma 1. *Consider a modification of the game described in Laibson's (1997) Theorem 1 as follows. Fix any t, and let δ_t apply specifically to the consumer's decision problem at $t+1$. The subgame perfect equilibrium decisions x_t and z_t of the consumer at t, and c_{t+1} and x_{t+1} of the consumer at $t+1$, are monotone in δ_t; specifically, $\frac{\partial x_t}{\partial \delta_t} \geq 0$, $\frac{\partial z_t}{\partial \delta_t} \leq 0$, $\frac{\partial c_{t+1}}{\partial \delta_t} \leq 0$, and $\frac{\partial x_{t+1}}{\partial \delta_t} \geq 0$. Moreover, $c_{t+1} < y_{t+1} + R_{t+1}x_t$ and $z_t > 0$ imply $\frac{\partial x_t}{\partial \delta_t} > 0$ and $\frac{\partial z_t}{\partial \delta_t} < 0$, and $c_{t+1} < y_{t+1} + R_{t+1}x_t$ implies $\frac{\partial c_{t+1}}{\partial \delta_t} < 0$.*

Proof. The Kuhn-Tucker conditions for consumer $t+1$'s optimization yield

$$u'(c_{t+1}) \geq \max_{\tau \in \{1,\ldots,T-t-1\}} \beta \delta_t^{\tau} u'(c_{t+\tau+1}) \left(\prod_{i=1}^{\tau} R_{t+i+1} \right) \tag{A.1}$$

If $c_{t+1} < y_{t+1} + R_{t+1}x_t$, then Laibson's P1 and P2 imply equality holds in (A.1). Fix

[10] It has even been given physical manifestation in architecture: a turret atop seaside houses called the "widow's walk" allowed the wife of the sailor pace while keeping her eyes fixed on the sea in anticipation of her husband's return.

any τ such that $t=\tau$ satisfies $\arg\max\left\{\beta\delta_t^{\tau}u'\left(c_{t+\tau+1}\right)\left(\prod_{i=1}^{\tau}R_{t+i+1}\right)\right\}$, and assume $t=1$ also satisfies. It follows that

$$u'\left(c_{t+1}\right)=\beta\delta_t u'\left(c_{t+2}\right)R_{t+2} \quad = \quad \beta\delta_t^{\tau}u'\left(c_{t+\tau+1}\right)\left(\prod_{i=1}^{\tau}R_{t+i+1}\right)$$

Total differentiation yields,

$$\begin{aligned}\beta\delta_t u''\left(c_{t+2}\right)R_{t+2}^2 dx_{t+1} &= -\beta u'\left(c_{t+2}\right)R_{t+2}d\delta_t \\ u''\left(c_{t+1}\right)dc_{t+1} &= \tau\beta\delta_t^{\tau-1}u'\left(c_{t+\tau+1}\right)\left(\prod_{i=1}^{\tau}R_{t+i+1}\right)d\delta_t\end{aligned}$$

Using Cramer's rule,

$$\begin{aligned}\frac{\partial c_{t+1}}{\partial\delta_t} &= \frac{\hat{\tau}\beta\delta_t^{\hat{\tau}-1}u'\left(c_{t+\hat{\tau}+1}\right)\left(\prod_{i=1}^{\hat{\tau}}R_{t+i+1}\right)}{u''\left(c_{t+1}\right)}<0 \\ \frac{\partial x_{t+1}}{\partial\delta_t} &= -\frac{u'\left(c_{t+2}\right)}{\delta_t u''\left(c_{t+2}\right)R_{t+2}}>0\end{aligned} \tag{A.2}$$

Assume WLOG instead that $c_{t+1}=y_{t+1}+R_{t+1}x_t$. Then c_{t+1} is no longer a function of δ_t, implying $\frac{\partial c_{t+1}}{\partial\delta_t}=0$. Similarly, if we assume WLOG that $t=1$ does not satisfy $\arg\max\left\{\beta\delta_t^{\tau}u'\left(c_{t+\tau+1}\right)\left(\prod_{i=1}^{\tau}R_{t+i+1}\right)\right\}$, $\frac{\partial x_{t+1}}{\partial\delta_t}=0$.

We turn to the Kuhn-Tucker conditions for consumer t's optimization, which yield

$$u'\left(c_t\right) \quad \geq \quad \max_{\tau\in\{1,\ldots,T-t\}}\beta\delta_{t-1}^{\tau}u'\left(c_{t+\tau}\right)\left(\prod_{i=1}^{\tau}R_{t+i}\right) \tag{A.3}$$

Consumer t's decisions with respect to x_t and z_t are influenced by δ_t through the parameter's effect on consumer $t+1$'s consumption decision. If $c_{t+1}<y_{t+1}+R_{t+1}x_t$ and $z_t>0$, then $t=1$ and $t=2$ both satisfy $\arg\max\left\{\beta\delta_{t-1}^{\tau}u'\left(c_{t+\tau}\right)\left(\prod_{i=1}^{\tau}R_{t+i}\right)\right\}$. It follows that

$$\beta\delta_{t-1}^2u'\left(c_{t+2}\right)R_{t+1}R_{t+2} \quad = \quad \beta\delta_{t-1}u'\left(c_{t+1}\right)R_{t+1} \tag{A.4}$$

Totally differentiation yields

$$\begin{aligned}
\beta\delta_{t-1}^2 u''(c_{t+2}) R_{t+1}^2 R_{t+2}^2 dz_t &= \beta\delta_{t-1} u''(c_{t+1}) \frac{\partial c_{t+1}}{\partial \delta_t} R_{t+1} d\delta_t \\
-\beta\delta_{t-1} u''(c_{t+1}) R_{t+1}^2 dx_t &= \beta\delta_{t-1} u''(c_{t+1}) \frac{\partial c_{t+1}}{\partial \delta_t} R_{t+1} d\delta_t \\
-R_{t+1} dx_t &= \frac{\partial c_{t+1}}{\partial \delta_t} d\delta_t
\end{aligned}$$

Recalling that $c_{t+1} < y_{t+1} + R_{t+1}x_t$ implies $\frac{\partial c_{t+1}}{\partial \delta_t} < 0$, it follows that

$$\begin{aligned}
\frac{\partial z_t}{\partial \delta_t} &= \frac{u''(c_{t+1})}{\delta_{t-1} u''(c_{t+2}) R_{t+1} R_{t+2}^2} \frac{\partial c_{t+1}}{\partial \delta_t} < 0 \\
\frac{\partial x_t}{\partial \delta_t} &= -\frac{1}{R_{t+1}} \frac{\partial c_{t+1}}{\partial \delta_t} > 0
\end{aligned}$$

It is straightforward to show that relaxation of either $c_{t+1} < y_{t+1} + R_{t+1}x_t$ or $z_t > 0$ implies $\frac{\partial z_t}{\partial \delta_t} = 0$, and relaxation of $c_{t+1} < y_{t+1} + R_{t+1}x_t$ implies $\frac{\partial x_t}{\partial \delta_t} = 0$. □

Lemma 2. *Consider a modification of the game described in Laibson's (1997) Theorem 1 such that there exist $\delta_0, \delta_1, \ldots, \delta_{T-1}$ whereby, for each $t = 1, \ldots, T$, δ_{t-1} applies to the consumer's decision problem at t. There exists a unique resource-exhausting joint strategy, $s^* \in S$, that satisfies Laibson's P1-P4 with δ_{t-1} in lieu of δ, and this strategy is the unique SPE strategy of this modified game.*

Proof. Follows trivially from Lemma 1. In particular, resource exhaustion follows, as the decision facing the consumer at T is unaffected by the tweak. □

Lemma 3. *Consider the modified game described in Lemma 2. Fix any particular value of t, $\delta_t = \bar{\delta}_t$, feasible history h_t, and any set of permissible values of all other exogenous variables. Let $\{c_t^*, x_t^*, z_t^*\}$ represent the actions in period t corresponding to the unique SPE strategy of the game. For any z_t^{**} such that $z_t^* \geq z_t^{**} > 0$, there exists a function $\hat{\delta}_t(z_t^*, z_t^{**})$ continuous on the domain of its arguments such that $\{c_t^{**}, x_t^{**}, z_t^{**}\}$ for some $c_t^{**}, x_t^{**} \geq 0$ represents the unique SPE strategy of the game when $\hat{\delta}_t$ replaces $\bar{\delta}_t$.*

Proof. Assume first that $c_{t+1}^* < y_{t+1} + R_{t+1}x_t^*$ holds for the unique SPE. Then by Lemma 1, $\frac{\partial x_t^*}{\partial \delta_t} > 0$, $\frac{\partial z_t^*}{\partial \delta_t} < 0$, and $\frac{\partial c_{t+1}^*}{\partial \delta_t} < 0$. The monotonicity of these statics in the neighborhood of the SPE implies further that $c_{t+1} < y_{t+1} + R_{t+1}x_t$ holds for $z_t \in (0, z_t^*]$, thus $\frac{\partial z_t}{\partial \delta_t} < 0$ similarly holds with strict inequality for $z_t \in (0, z_t^*]$. The existence of $\hat{\delta}_t(z_t^*, z_t^{**})$ as described follows by the Inverse Function Theorem.

Now WLOG assume $c^*_{t+1} = y_{t+1} + R_{t+1}x^*_t$ for the unique SPE. It is clear that increasing δ_t from $\bar{\delta}_t$ eventually results in equality in the Kuhn-Tucker expression in(A.1), whereby $c_{t+1} < y_{t+1} + R_{t+1}x_t$ so that $\frac{\partial x_t}{\partial \delta_t} > 0$, $\frac{\partial z_t}{\partial \delta_t} < 0$, and $\frac{\partial c_{t+1}}{\partial \delta_t} < 0$ follow by Lemma 1. The monotonicity of these statics in the neighborhood of the new SPE implies further that $c_{t+1} < y_{t+1} + R_{t+1}x_t$ holds for $z_t \in (0, z^*_t]$, thus $\frac{\partial z_t}{\partial \delta_t} < 0$ similarly holds with strict inequality for $z_t \in (0, z^*_t]$. The existence of $\hat{\delta}_t\left(z^*_t,\, z^{**}_t\right)$ as described follows, here again, by the Inverse Function Theorem. □

Proof of Theorem 1. Fix any period t and feasible history h_t. Taking the existence of $\hat{\delta}_t\left(z^*_t,\, z^{**}_t\right)$ as provided by Lemma 3, let us define

$$\delta^{**}_t \;\equiv\; \lim_{z^{**}_t \to 0} \hat{\delta}_t\left(z^*_t,\, z^{**}_t\right) \tag{A.5}$$

The existence of δ^{**}_t follows from the continuity provisions of Lemma 3. Because we began with arbitrary t and history h_t, it follows that $\left\{c^{**}_{t+\tau},\, x^{**}_{t+\tau},\, \delta^{**}_{t+\tau}\right\}_{\tau=0}^{T-t}$ is the resource-exhausting joint strategy, $s^* \in S$, that is the unique subgame perfect equilibrium strategy of the game as defined.

It remains to show that s^* satisfies C1-C5. C1 and C2 follow immediately as the Euler conditions from consumer t's optimization, which is unchanged from the Laibson setup with respect to the consumer's tradeoff of current period consumption versus future consumption, except that δ_{t-1} replaces δ. To show that C5 is met, consider that $\frac{\partial z_t}{\partial \delta_t} < 0$ (Lemma 1) and definition of δ^{**}_t in (A.5) imply $\delta^{**}_t \geq \delta_0$. To show $\delta^{**}_t \leq \frac{\delta_0}{\beta}$, let us first assume not. For any $t > 1$, $\delta^{**}_t > \frac{\delta_0}{\beta}$ induces a contradiction between C1 and C2 on the one hand, and C3 and C4 on the other. Therefore, $\frac{\delta_0}{\beta} \geq \delta^{**}_t \geq \delta_0$.

With regard to satisfaction of C3 and C4, consider three cases from the Laibson setup. First, suppose, $u'\left(c_{t+1}\right) = \max\limits_{\tau \in \{1,\ldots,T-t-1\}} \delta^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right)$. In this case neither $x_t = 0$ nor $z_t = 0$ bind. It follows from $\frac{\partial z_t}{\partial \delta_t} < 0$ (Lemma 1) and definition of δ^{**}_t in (A.5) that a constraint of $z_t = 0$, consistent with my setup, implies $\delta^{**}_t > \delta_0$ as an element of the unique SPE such that $u'\left(c_{t+1}\right) = \max\limits_{\tau \in \{1,\ldots,T-t-1\}} \delta_0^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right)$. This satisfies C3, whereby it follows that C3 and C4 are satisfied for this case.

Alternatively, suppose $u'\left(c_{t+1}\right) > \max\limits_{\tau \in \{1,\ldots,T-t-1\}} \delta^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right)$. By P4, this implies $z_t = 0$ under the Laibson setup. By the definition of δ^{**}_t in (A.5), the unique SPE under my setup therefore implies $\delta^{**}_t = \delta_0$. Thus $u'\left(c_{t+1}\right) > \max\limits_{\tau \in \{1,\ldots,T-t-1\}} \delta_0^\tau \left(\prod\limits_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right) >$

$\max_{\tau\in\{1,\ldots,T-t-1\}} \beta\delta_0^{\tau}\left(\prod_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right)$, whereby the Euler condition for consumer $t+1$'s optimization implies $c_{t+1}^{**} = y_{t+1} + R_{t+1}x_t^{**}$. This satisfies C4, hence it follows that C3 and C4 are satisfied for this case.

Finally, let us suppose $u'\left(c_{t+1}\right) < \max_{\tau\in\{1,\ldots,T-t-1\}} \delta^{\tau}\left(\prod_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right)$. By P3, this implies $x_t = 0$ under the Laibson setup, which means therefore also $z_t > 0$. As in the first case, this implies $\delta_t^{**} > \delta_0$ as an element of the unique SPE under my setup such that $u'\left(c_{t+1}\right) = \max_{\tau\in\{1,\ldots,T-t-1\}} \delta_0^{\tau}\left(\prod_{i=1}^{\tau} R_{t+i}\right) u'\left(c_{t+\tau+1}\right)$. This satisfies C3, whereby it follows that C3 and C4 are satisfied for this case.

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