

Self-defeating behaviour, Personal Rules and Social Norms

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Submitted in fulfilment / partial fulfilment of the requirements for the degree of
.....MSSC....., in the Graduate Programme in ...Philosophy....., University of
KwaZulu-Natal, South Africa.

I declare that this dissertation is my own unaided work. All citations, references and borrowed ideas have been duly acknowledged. I confirm that an external editor was / was not used (delete whichever is applicable) and that my Supervisor was informed of the identity and details of my editor. It is being submitted for the degree ofM.S.S.C...... in the Faculty of Humanities, Development and Social Science, University of KwaZulu-Natal, South Africa. None of the present work has been submitted previously for any degree or examination in any other University.

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For

Mommy

(In loving memory of Christine Govender)

I am here today because of you; thank you for always being there

ABSTRACT

This dissertation explores Ainslie's account of self-defeating behaviour as portrayed in *Breakdown of Will* (2001). Self-defeating behaviour can be described as voluntarily doing that which we know we are going to end up regretting (Ainslie 2001:3). It is puzzling why anyone would willingly choose to behave in such an ill-rewarding manner of which they know the negative consequences it will bear prior to them engaging in that behaviour; yet, at the same time, it is also fascinating, as despite it being behaviour people know that they are undoubtedly going to regret; many can claim to have fallen prey to it. Exploring this weakness of self-defeating behaviour, I refer to Ainslie's explanation of the phenomenon and his suggestions regarding possible strategies for curbing it. One of the strategies Ainslie suggests against self-defeating behaviour is *personal rules* (also known as the will), which he argues is a form of intertemporal bargaining between the successive interests, or temporal stages of the self (Ainslie 2001:78-85). Although, for the most part, his description is quite detailed, comparing our successive selves to players in an *iterated prisoner's dilemma* game, there are limitations in his explanation as he seems, for one, not to consider some of the conditions for cooperation associated to the concept of an iterated prisoners' dilemma game. I, thus, turn to *social norm* theorist, Bicchieri's *The Grammar of society* (2006), in an attempt at an improved illustration of personal rules beyond its comparison to an iterated prisoner's dilemma game. I note similarities between social norms (Bicchieri) and personal rules (Ainslie) such that the reasons we follow social norms could be analogous to the reasons behind us following certain personal rules. But Bicchieri's description of social norms can be explained in a more general way, which I suggest may be a better framework for thinking about the will than an iterated prisoner's dilemma.

ACKNOWLEDGEMENTS

I would like to extend my thanks to the University of KwaZulu Natal for allowing me the opportunity to complete my studies after the sudden and tragic loss of my mom. Having had to immediately relocate to Johannesburg and suspend my studies while I worked through my grief, it took me much soul-searching and time to be able to find the strength to return to my studies and finish what I started. I would, thus, like to thank those who supported me in this endeavour, particularly, my supervisor, Professor David Spurrett for his patience and guidance through this process.

I also would like to extend my thanks to my family and my friends for their unwavering support but most especially I would like to thank Christine Govender without which I would never have found the strength to continue. It is she, more than anyone, who wanted me to complete my studies and attain my Masters; it is for her, that I was able to take this step.

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1.

INTRODUCTION TO SELF-DEFEATING BEHAVIOUR

1.1. Introduction

This dissertation explores Ainslie's account of self-defeating behaviour as portrayed in *Breakdown of Will* (2001). Self-defeating behaviour can be described as voluntarily doing that which we know we are going to end up regretting (Ainslie 2001:3). It is puzzling why anyone would willingly choose to behave in such an ill-rewarding manner of which they know the negative consequences it will bear prior to them engaging in that behaviour; yet, at the same time, it is also fascinating, as despite it being behaviour people know that they are undoubtedly going to regret; many can claim to have fallen prey to it. This is made apparent by the fact that self-defeating behaviour can be seen in many areas of our decision-making from procrastination; entering or staying in bad relationships; failing to carry out plans (like sticking to a diet); to the more extreme arena of addiction (addiction being a significant problem as evident from the numerous support groups and recovery programmes being conducted in the world so to curb the problem), all of which bear negative consequences (such as, for example, the gaining of weight if one fails to carry out the plan of sticking to a diet) (Ainslie 2001:3). And because the consequences of such behaviour are negative, if indulged in over an extended period of time, our *utility maximization potential* suffers as instead of gaining the most we can possibly gain from a rewarding choice, we lose what we could have had by giving in to that self-defeating choice that tempts us away from the more rewarding option.¹ This is why we end up regretting giving in to self-defeating behaviour; regret which could also lead to feelings of guilt or shame (due to us falling victim to a temptation and losing a better reward/utility), a consequence that further diminishes any value received from pursuing the tempting self-defeating choice.

¹ Utility refers to reward value. Utility maximization potential is the most reward value one can get out of a particular situation. This is undermined when we make decisions that jeopardize getting the most possible reward.

Long-term or long run as I will be using the terms don't mean anything technical; rather it indicates a long enough interval for changes of preference to become apparent.

Self-defeating behaviour is particularly evident in addiction. "These are the "bad habits" that we're aware of wanting to avoid but that we find ourselves willfully giving in to [...]" (Ainslie 2001:48). And even though we may make conscious efforts to avoid an activity, we may find ourselves changing direction and just as deliberately indulging in that same activity we previously made efforts to avoid (Ainslie 2001:49-50). Thus, we see that the "defining feature of "addiction" [...] is that the imminent prospect of such activities is strongly rewarding, but they're avoided if foreseen from a distance and regretted afterward" (Ainslie 2001:49).

Exploring this weakness of self-defeating behaviour, I refer to Ainslie's explanation of the phenomenon and his suggestions regarding possible strategies for curbing it. One of the strategies Ainslie suggests against self-defeating behaviour is *personal rules* (also known as the will), which he argues is a form of intertemporal bargaining between the successive interests, or temporal stages of the self (Ainslie 2001:78-85).² Although, for the most part, his description is quite detailed, comparing our successive selves to players in an *iterated prisoner's dilemma* game, there are limitations in his explanation as he seems, for one, not to consider some of the conditions for cooperation associated to the concept. He does address the issue of cooperation quite extensively but his focus on the will being like an iterated prisoner's dilemma game (which is the bulk of his argument) is restrictive to the nature of the will as it could be.³ I, thus, turn to *social norm* theorist, Bicchieri's *The Grammar of society* (2006), in an attempt at an improved illustration of personal rules beyond Ainslie's comparison of it to an iterated prisoner's dilemma game. I note similarities between social norms (Bicchieri) and personal rules (Ainslie) such that the reasons we follow social norms could be analogous to the reasons behind us following certain personal rules. But Bicchieri's description of social norms can be explained in a more general way which I suggest may be a better framework for thinking about the will than an iterated prisoner's dilemma.

1.2. Why are people susceptible towards self-defeating behaviour (according to Ainslie)?

Self-defeating behaviour involves choosing between mutually exclusive rewards of different values, each choice having its own set of conditions and consequences. Self-defeating behaviour, in this instance, is then usually choosing the reward of less value at the expense of the more valuable reward. But why would anyone make such a choice? Part of the reason is that the rewards may be delivered at different times.

People tend to discount the future i.e. we evaluate future rewards in relation to its distance such that the further away a reward is from being delivered, the less valuable it appears to be (Ainslie

² I will be using the terms, 'personal rules' and 'the will', interchangeably. Refer to sections 2.3 and 3.1 for more details on personal rules.

³ Iterated prisoner's dilemma is a type of prisoner's dilemma game. Prisoner's Dilemma and the iterated version of the game are addressed within sections 1.4, 1.4.1 and 3.2.

The term *game* refers to "All situations in which at least one agent can only act to maximize his utility through anticipating (either consciously, or just implicitly in his behavior) the responses to his actions by one or more other agents [...]" (Ross 2006) in *game theory* which is "the study of the ways in which *strategic interactions* among *rational players* produce *outcomes* with respect to the *preferences* (or *utilities*) of those players, none of which might have been intended by any of them" (Ross 2006).

The multitude of varying strategies that can occur in an iterated prisoner's dilemma setting including mutual cooperation, mutual defection and outcomes of these plays can be seen more in sections 1.4.1 and 3.2.

2001:chapter 3). If we were offered R200 today versus the same amount tomorrow, for example, what would we choose? In all likelihood, devoid of any special circumstance, we would prefer the R200 today. The reason we discount is probably due to the fact that the further away something is from being claimed, the more risk is attached to us ever being able to claim it.

But what would happen if an offer was made between R200 today versus R210 tomorrow? Waiting just a day more, would gain us R10 extra. But is this extra enough to tempt us to forgo an immediate R200? It would depend on our personal circumstance (we could need that R10 extra) and how we discount. People discount differently, so how valuable or worthless a reward is, depends on how we personally evaluate rewards and distance; and action is based upon that result. But assuming that there is no special circumstance and that our discount behaviour is such that, for example, every hour that passes, the reward of R210 decreases by R1 (i.e. $R1 \times 24 \text{ hours} = R24$; and $R210 - R24 = R186$). This means that the original offer of R210 is now when faced with the decision between R200 today or R210 tomorrow, only worth R186 due to that delay). Thus, it could be thought that the smaller amount could still be chosen because the extra may not be worth the delay. Also, with delay comes risk, so the promise of R10 may still not have been tempting enough to chance losing a sure R200 (But if a reward is worth the delay such as the choice between R100 today or R1000 tomorrow, our preference may increase towards the R1000 since even though it is only available tomorrow, that delay is worth a chance at an extra R900). Things may, however, change if we were now asked to choose between R200 in two years and R210 in two years and a day (same reward values offered at the same distance away from each other). Since they are both at a distance from now (the moment we have to choose), the value of each reward (and their distance from each other) may not matter that much to our current state and as a result we may choose the larger R210 from this distance. But *Conventional Utility Theory* suggests that if we choose a particular reward between a pair of available options when the opportunity is right at hand, we would choose that same particular reward whether it was a week or a year away (Ainslie 2001:29). This implies that if, today, we choose the later, larger (*LL*) reward over the sooner, smaller (*SS*) reward, we should consistently choose as such no matter when faced with this decision in the future. The *Conventional Utility Theory* refers to this consistent and stable preference as *exponential discounting* as represented in Figure 1 (Ainslie 2001: chapter 3).⁴

“The discounting method that can be summarized for delays of any length by the formula:

$$\text{Value} = \text{“Objective” value} \times (1 - \text{Discount rate})^{\text{Delay}}$$

(Ainslie 2001:29).

⁴ “The discount function is called “exponential” because it calculates value by an exponential, or power function of the discount rate” (Ainslie 2001:29).

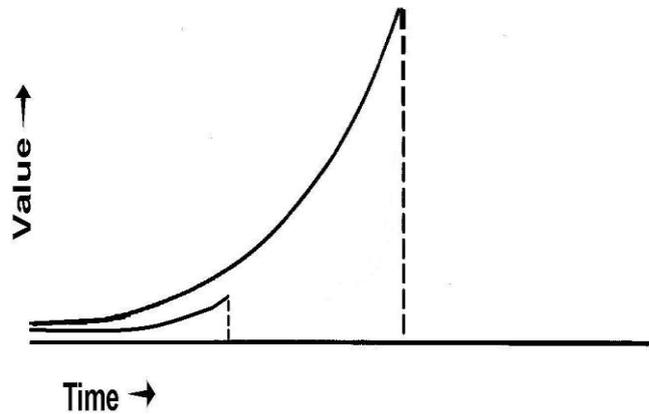


Figure 1. The exponential discount curves in this graph represent two rewards of different sizes, available at different times. The value of a reward increases as the time towards its availability decreases but among competing reward choices, as depicted above, the value of a reward remains consistently proportional to its size.

(Ainslie 2001:32).

The above graph shows that if we were exponential discounters we would consistently pursue one option, with greater preference towards the *LL* reward. But if it were the case that we consistently preferred the *LL* reward, how do we explain those events where we choose the less valuable *SS* reward, i.e. how do we explain our self-defeating behaviour? Here, becomes evident the problem with *conventional utility theory*. It assumes people's evaluations of rewards are exponentially discounted, "and hence, consistent over time; as a result, utility theory hasn't been able to account for self-defeating choices [...]" (Ainslie 2001:39).

Ainslie observed Herrnstein's (1961) 'matching law' which indicates that we make choices in direct proportion to the frequency and size of a reward (depending on whether one or both aspects are relevant) and suggested it implies valuation in inverse proportion to delay (Ainslie 2001:35).⁵ "Many researchers have since offered variations to fine-tune the matching law to describe individual differences in impatience, but the best seems to be one of the simplest":

⁵ Section 2.2 has more details on the matching law.

$$\text{Value} = \text{Amount} / (\text{Constant}_1 + (\text{Constant}_2 \times \text{Delay}))$$

(Ainslie 2001:35).

This observation suggested a hyperbolic discount curve predicting preference reversals – seen in *Figure 2*, below, where for a while we would pursue an *LL* reward but as the *SS* reward's availability approaches, it would become preferred over the *LL* reward.

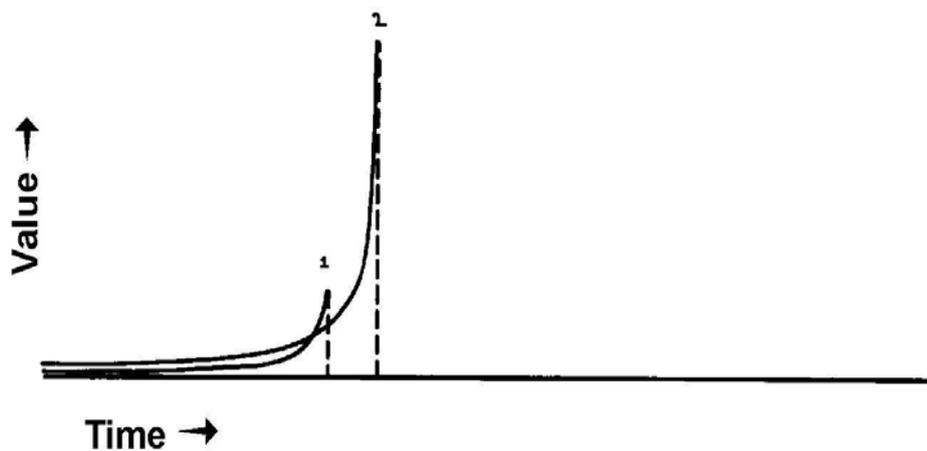


Figure 2. Hyperbolic discount curves from two rewards of different sizes available at different times. The smaller reward is temporarily preferred for a period before it is available, as shown by the portion of its curve that projects above from the later, larger reward.

(Ainslie 2001:32).

This graph shows that although we start off preferring the *LL* reward (2) over the *SS* reward (1), as we approach the availability of the *SS* reward it appears to be more valuable, overshadowing the greater value of the *LL* reward and as such we become tempted and temporarily prefer it over the *LL* reward. This change is indicated by a curve crossing (where curve 1 crosses curve 2) (Ainslie 2001:32).

When experimenters have used this kind of reward, people have shown a persistent tendency to reverse their preferences as *D* changes, evidence that their basic discount curves cross and are thus

more hyperbolic than exponential: People exposed to noxious noise are given a choice between shorter, earlier periods of relief and longer, more delayed periods choose the shorter periods when D is small and the longer periods when D is long. College students show the same pattern when choosing between periods of access to video games. Retarded adolescents show it in choosing between amounts of food. Certainly at gut level, people's discount curves cross

(Ainslie 2001:33).^{6,7}

Ainslie argues that this exchange of, "hyperbolic discounting for the exponential kind in the reward-maximizing process supplies utility theory with its missing element. Utility theory can now explain the seductiveness of self-defeating choices [...]" (Ainslie 2001:39).

Since hyperbolic discounting makes our choices unstable, leaving us vulnerable to temptation, we become exposed to the negative consequences of choosing poorly (i.e. self-defeating behaviour) and so have reason to find ways of resisting this temptation and essentially curbing our hyperbolic tendency (Ainslie 2001: chapter 3).

1.3. Curbing our hyperbolic tendency towards impulsive (self-defeating) behaviour

With hyperbolic discounting instead of exponential discounting, utility theory now says that people will naturally go for smaller, earlier over larger, later rewards. We're unable *not* to choose the reward that looms largest when discounted to the moment of choice.

(Ainslie 2001:39).

Could we learn not to choose poorly in the face of temptation and make our curve exponential? Is knowing the cause of our actions enough to prevent these actions? According to Ainslie, acknowledging our evident hyperbolic tendency is not enough to encourage us to stabilize our preferences towards the better alternative as knowing doesn't take away the temptation of the SS reward when it becomes imminent (Ainslie 2001:39). So how are we ever able to overcome this tendency and choose a better alternative? Ainslie suggests, amongst other things, that we can

⁶ D , here, is delay.

⁷ More and more evidence is leaning towards our natural discount curve being not only non-exponential but specifically hyperbolic. This is evident when curves cross from alternative rewards available at different times (Ainslie 2001: 31).

sometimes use *personal rules* against self-defeating behaviour.⁸ Personal rules work by making a current choice a member of a category such that it could serve as a *precedent* for all future choices of the same sort such that the choice that we make now, could according to our personal rule, represent all future choices. Future choices of the same sort refers to every time we are faced with this decision between this particular type of *SS* reward and *LL* reward, ever again in the future, the implication being that how we choose now could suggest likely behaviour with regard to a similar decision in the future. So if we choose poorly now, we could do so again in the future. This works by *bundling* the *SS* and *LL* rewards of all similar decisions we will make in the future. The bundling stakes these *SS* rewards and the *LL* rewards against each other, such that if we choose an *SS* reward now, we not only lose an individual future reward (i.e. we not only lose this *LL* reward, we would have gotten had we selected the *LL* reward with regard to this decision), we risk losing the entire *LL* reward bundle.⁹ Here, 'stake them against each other' suggests that we weigh the *SS* reward bundle against the *LL* reward bundle such that choosing the single *SS* reward now places the entire series of *LL* options at risk. The threat of such a great loss could dissuade us from self-defeating behaviour (Ainslie 2001:78-100). To illustrate this, consider the following example: Alice is on a diet and wants to lose weight. But Alice's co-workers invite her to a party where she is faced with lots of fatty foods that would go against her diet. The problem is Alice loves chocolate cake and she is given a piece. She, thus, has the choice between eating that piece of cake or being thin. But surely, Alice contemplates that eating that chocolate cake just this once wouldn't make her fat. This may be true but according to Ainslie's theory of personal rules, one's current choice can represent one's likely future choices, such that if she gives in to temptation this time, she could in all likelihood give in to that temptation again if faced with a similar such decision in the future. Bundling according to a personal rule, could help Alice forgo the cake by allowing her to see her choice as indicative of how she could behave with regard to all the fatty temptations she may face in the future. So instead of asking herself, 'Do I want to eat this piece of chocolate cake now', she asks, 'Do I want to sacrifice my pattern of healthy eating?'. This can, sometimes, be motivating enough to help forgo the temptation.

Ainslie says that personal rules may be the strongest and most versatile tool we have against self-defeating behaviour; and in explaining the nature of the will, Ainslie suggests that it operates in a situation that is like an *iterated prisoner's dilemma game* which is a type of *prisoner's dilemma game*.¹⁰ But before we unpack what he means by this comparison, let us consider the nature of a prisoner's dilemma.

⁸ See section 2.3.

⁹ Refer to sections 2.3 and 3.1 for more details on personal rules (the will).

¹⁰ The will seems to be the most successful of the other strategies that Ainslie suggests against combating self-defeating behaviour. These other strategies are discussed within section 2.3.

1.4. Prisoner's Dilemma

Prisoners' dilemma is a non-zero sum game (a zero-sum game is a game where a win for one player means a loss to the other. For a non-zero sum game, on the other hand, it is possible for all the players to win) where players can either "cooperate" or "defect" one another with the aim of maximizing their own pay-off (Kuhn 2007; Dawkins 1989:220). In such a game “players have the incentive not to cooperate independently, no matter what. But collectively they would be better off if they did cooperate. This tension between individual incentive and collective incentive is what makes the PD intriguing” (Flake 2000).

For a simple two player one-shot prisoner’s dilemma, where each player makes a single move (choosing between ‚co-operate’ and ‚defect’) the payoffs are as follows:

	Player 1 cooperates	Player 1 defects
Player 2 cooperates	R,R	S,T
Player 2 defects	T,S	P,P

To make the game a prisoner’s dilemma (assuming that the payoff magnitudes are the same for both players, which they need not be) the payoffs have to conform to the following inequality:

$$T > R > P > S.$$

R represents the reward payment each player receives if they both cooperate. P would be the punishment each player receives if both players defect. T is the temptation to defect against co-operation. And S is the suckers' pay-off that one player receives when she alone cooperates and her opponent defects (Kuhn 2007).

In a once off game, defection is the *dominant strategy* because no matter how the opponent plays, one

can not do any better than defecting. An outcome of mutual defection (*DD*) is the single *Nash Equilibrium* (in that players have no incentive to change their strategy given how other players may play), an outcome of mutual cooperation (*CC*) is a *Pareto Optimal* situation (in that no player could be better off without another becoming worse off) (Kuhn 2007).¹¹

A game with more than one round is referred to as an iterated or repeated prisoner's dilemma, which is the game type that Ainslie uses in his explanation of the will. Let us further explore this area.

1.4.1. Iterated Prisoner's Dilemma

In an iterated prisoner's dilemma if a player defects when the opponent cooperates in one round, the opponent could retaliate by defecting in the next round which might undermine both players' attempts at long run utility maximization in that both get less than if they engage in successive mutual plays of cooperation.

To illustrate this, let us briefly consider, political scientist Robert Axelrod (1984) who shows that within the iterated prisoner's dilemma game structure, what he calls, 'nice' strategies do better in the long run (at least against some combinations of strategies), than 'nasty' ones.¹² He came to this conclusion after holding a computer tournament based on the iterated prisoner's dilemma game, whereby, he called for strategies (which in this case were computer preprogrammed rules for action) from some experts in the field of game theory (as well as from other arenas). 15 strategies were played against each other in 200 successive rounds. The winner was declared at the end of the 200 rounds and was judged on which strategy had the most points based on the following structure: $T = 5$, $R = 3$, $P = 1$, $S = 0$ (Dawkins 1989: Chapter 12).¹³

The winning strategy was *Tit for Tat* which works by cooperating at the commencement of a game and, thereafter, copying every previous move the opponent makes. How does this strategy work in relation to other strategies? It depends on how the other strategy played. Against another *Tit for Tat*

¹¹ A Nash equilibrium in game theory is when players have no incentive to change their strategy given the actions or the strategies of the other players (Pietersz 2006-2008).

“In game theory, a Pareto optimal outcome is one in which no player could be better off without another becoming worse off” (Pietersz 2006-2008).

¹² Section 3.2 has detailed definitions of 'nice' and 'nasty' etc.

¹³ A more detailed account of Axelrod's tournament can be found in section 3.2.

strategy, for instance, they would both begin by cooperating and, thereafter, copy each other's previous move. This means that they would be locked in a game of constant mutual cooperation until the last move is made in the last round of the game, which leads to a Pareto Optimal outcome (Dawkins 1989: chapter 12).

But against another strategy such as *Naïve Prober*, for example, which is like the *Tit for Tat* strategy except a defection is thrown in once in a while, *Tit for Tat* would receive the sucker's pay-off (when that defection is made) but retaliate in the next move, and *Naïve Prober* then receives the sucker's pay-off.¹⁴ So although they have the same points, it is less than they would have received had they both continuously cooperated like the *Tit for Tat* strategies against each other. “So, when *Naïve Prober* plays against *Tit for Tat*, both do worse than when *Tit for Tat* plays against another *Tit for Tat*. And when *Naïve Prober* plays against another *Naïve Prober*, both tend to do, if anything, even worse still, since runs of reverberating defection tend to get started earlier” (Dawkins 1989:211).¹⁵ Another condition for an iterated prisoner's dilemma is that $(T+S)/2 < R$ which makes it the case that taking turns to be the sucker is worse than mutual cooperation.

In iterated prisoner's dilemma, mutual cooperation would bring players the maximum utility; the only better outcome is if one opponent continuously/frequently cooperated to our continuous/frequent defection but this is unlikely as strategies aiming for utility maximisation tend to retaliate against defections. If we hope to avoid retaliation we must play „nice’ so long as our opponent plays „nice’ and that will bring us the best we can expect in terms of utility in an iterated prisoner's dilemma.

1.4.1.1. The self as a population

In reading *Breakdown of Will*, we discover that Ainslie portrays the self as a population where our successive interests interact with one another. These successive interests can compete with each other but sometimes they can be engaged in 'limited warfare' where despite having conflicting goals, they can share a common goal that one may not want to risk in order to satisfy a self-interested goal (an *SS* reward).¹⁶ But how exactly is a single person with successive interests, making hyperbolically

¹⁴ *Naïve Prober* wasn't one of the 15 strategies that participated in Axelrod's tournament; however, Dawkins introduced it in his analysis of the tournament so to demonstrate how the submitted strategies may interact with a 'nasty' strategy such as *Naïve Prober*.

¹⁵ Refer to section 3.2 for more detailed outline of the *Tit for Tat* strategy within an iterated prisoner's dilemma setting.

¹⁶ „Limited warfare’ refers to parties with conflicting goals that share a common goal that they do not necessarily want to risk in favour of their selfish goal that may conflict with their opponent's goal. This common goal encourages mutual cooperation which is why Ainslie says that iterated prisoner's dilemma can

discounted choices in the face of conflicting rewards, supposed to be a population of diverging interests as Ainslie suggests?

Ainslie says that when facing a decision between conflicting rewards we, being hyperbolic discounters, often tend to reverse our original preferences, preferring smaller rewards when they're imminent, even though at longer distances we'd prefer the larger, later ones. This means we sometimes do things at one time only to undo them later. If this is true and we are aware that as hyperbolic discounters what we do in a particular situation regularly gets undone later, we'll be inclined – if we can – to learn to stop doing it in the first place. In trying to stabilize our preferences by taking precautions against the future self that will try to undo these preferences, we'll be like a group of conflicting people rather than a single individual because the current self making attempts to ensure his future self doesn't do what the current self doesn't want him to do is more like the actions of separate individuals than one person.

If one applies the iterated prisoner's dilemma pattern of choices to personal rules, we can compare choosing the *SS* reward now to defecting against the future possibly cooperative self (which would be like the other player in a game of iterated prisoner's dilemma); and choosing the *LL* reward can be compared to cooperation with the future self. And if we know that we will be dealing with a player (whether thought of as a future self in the case of bundling or an opponent in an iterated prisoner's dilemma game) again, mutual cooperation may be the preferred outcome in the long run.

The will in this way is, says Ainslie, like a 2 player game of iterated prisoner's dilemma but if we had more interests, it would be more like a multi-player game; and in such a case, only if enough other interests cooperate, would we do well to cooperate too.¹⁷ In a once-off game, we would do better to defect but in an iterated game, if we as a single player defect, the other players could retaliate against us in the next round.

In the single person interpretation prisoner's dilemma game, the sequential temporal stages of an

solve limited warfare. See section 3.2 for more on limited warfare.
¹⁷ See section 1.4.2.

individual reflect Ainslie's theory of competing interests (these are generally interests one person has at different time periods).

Let us look at these types of prisoner's dilemma in a little more detail so to understand how they work and how they will compare.

1.4.2. Multiple player prisoner's dilemma

This game is a prisoner's dilemma game with many players playing against each other.¹⁸ Again, here, each player has the option to either cooperate or defect.

The multi-player structure of this game can be reflected in what Garret Hardin (1968) popularized in "the tragedy of commons", where each member of a farming community prefers to have his cattle graze on the common grounds rather than on his own depleted land source, however, if the common grounds are over-grazed, it would be rendered inadequate (Kuhn 2007). This seems inevitable, if we look at this example in an iterated prisoner's dilemma context (i.e. a game with many rounds) in that, given that each member wants the same thing i.e. nobody wants to deplete their land source but everybody wants their cattle to have place to graze, they *all* turn to the commons (to protect their own land) but if *all* of them do this, the commons would eventually end up over-grazed and, thereby, useless (and as such not only would the commons be useless, the community would then have to turn back to their own private land sources that they were protecting). So in order to gain the benefit, B (of their cattle grazing, yet protecting their own private land sources), a sufficient number of people need to pay a cost, C (such as using the commons sparingly or perhaps making a schedule of sorts, sharing the commons in alternating periods, and using their private land source when not using the commons). This can be seen as follows:

¹⁸ This can be compared to the individuals within a society interacting with one another where Bicchieri's following of social norms could also explain or be explained by this type of prisoner's dilemma game.

	<i>n</i> or fewer choose C	More than <i>n</i> choose C
C	C	- C+B
D	0	B

For 1 player

(Kuhn 2007).

In this pay-off matrix (as seen above), *n* represents a specific 'base' figure that is enough to make an impact on the outcome of this situation. If less than this figure chooses to cooperate and pay a cost, it would make just as much difference in the long run as if nobody cooperated at all, in that the commons is still at risk. If one person cooperates and less than *n* cooperates, that one person would simply pay a cost, *C*, and not gain anything as the commons would still be at risk, regardless of the effort she puts. If she defects and also doesn't pay a cost, she gets 0. But if more than *n* cooperates and pays the cost and she follows suit, she would receive the benefit of this mutual effort at the small cost of using the commons sparingly ($- C + B$) as *more than n* does. If, on the other hand, she decides to defect whilst *more than n choose C*, she would receive a benefit, *B*, without paying any cost. Benefiting without cost is the temptation, whilst benefiting with cost is the reward. The punishment would be getting nothing for nothing and the sucker's pay-off would be paying a cost and getting nothing in return. This would be ordered as: $B > (-C+B) > 0 > C$. Again *D* dominates while $(-C+B)$ from the mutual play of *C* is known to be the Pareto optimal outcome for both, by both.

The tragedy of the commons game has a somewhat different character than the two-player [prisoner's dilemma]. First, even if each player's moves are entirely independent of the others, the alternatives represented by the columns in the commons matrix above are no longer independent of the alternatives represented by the rows. My choosing *C* necessarily increases the chances that more than *n* people will choose *C*. To ensure independence we should really redraw the matrix as follows:

	<i>n</i> or fewer choose C	<i>n</i> others choose C	More than <i>n</i> choose C
C	C	- C+B	- C+B
D	0	B	B

For 1 player

(Kuhn 2007).

Now *D* is not the dominant move as when the number of cooperators are sufficient, we would be better off cooperating too.

1.4.3. Single person interpretation

A multi-player prisoner's dilemma can be seen within a person but here the multiple players would be represented by temporal stages of that individual. Here, in an iterated prisoner's dilemma context, there is memory of the previous move and there can be an accumulation of stakes from move to move. To illustrate this, consider the example of smoking where if we did engage in this habit, there may be no difference in our state of health from one day to the next, but over an extended period of time, the effects would become evident. And even though there is no difference if we smoke just one cigarette now, there is still a dilemma because when we're at that point when our health is suffering as a result of past smoking, we're likely to regret our past actions and would probably do almost anything to not have taken that first cigarette.

How would we structure this in a game? Here the opponents of the prisoner's dilemma game would be our current self (interest to smoke) and our future self (interest to be healthy), both interests active at both stages (i.e. while we may want to smoke, we simultaneously want to be healthy and while we want to be healthy, we may still simultaneously also want to smoke). Cooperating for the current self would be to quit smoking (or at least limit our daily intake) while defecting would be to continue smoking. Cooperating benefits the future self as it would be healthy, and defecting would harm the future self as it would suffer. But how would the opponent (i.e. future self) play this game? What does it's cooperating or defecting do for the game and how does its choices affect the current self? Could cooperation on the part of the future self (the interest of health) be the allowance of smoking to a limit; and could defection be the prohibition of smoking all together? Then what would the pay-off matrix look like? Here is one possibility:

	Current self cooperates	Current self defects
Future self cooperates	- $C+B$, - $C+B$ smoke/smoke limited + healthy living	C, B
Future self defects	B, C	$0, 0$

Here, $B > (-C+B) > 0 > C$.

C – Cost

B – Benefit

If both cooperate, there would be reward for both players at a small cost; for the current self, the reward would be smoking at the cost of reducing future health; and for the future self the reward would be healthy living at the cost of smoking.

If one cooperates and one defects, the one that defects gets the benefit without the cost while the cooperator pays the cost without benefit i.e. if the smoking interest cooperates and quits or limits smoking, the health-interest could defect and not allow smoking all together which means that this interest would get the benefit of being healthy from the smoking interest's cooperation to limit smoking (as this limited smoking contributes to our healthy well-being); and if the health-interest cooperates by allowing limited smoking, whilst the smoking interest defects and smokes as much as it wants, then it gets the benefits of smoking as much as it wants from the health-interest's cooperation of allowing smoking. It may seem odd if we think of these different interests in terms of an individual being affected by the plays of cooperation or defection but if Ainslie is correct in his description of the will, we can see things differently. If the smoking interest defects by allowing smoking and the health-interest defects by prohibiting smoking, since the health-interest is in this case the future interest, it doesn't seem to do anything as the future is a result of the past (the choices of the current self). The future self doesn't gain anything while the current self does without apparently losing anything, as if the future self cooperated and the current self defected. But since the current self and the future self are representative of competing interests in one person, the current self does lose because the future self loses. This is because even though these interests have conflicting goals, they share a common goal ('limited warfare'). So although the smoking interest pursues the goal of

smoking and the non-smoking/health-interest pursues the goal for health, by no means does either interest want the lung-cancer (a possible and often inevitable effect of long-term smoking). This *not* wanting lung cancer is their shared goal. So if the future interest is undermined, the past interest is undermined because the shared goal is undermined.

Prisoner's dilemma is a very specific game structure and Ainslie's account of the will is heavily focused on this game. Bicchieri's account of social norms and the conditions under which they will be respected is more general, and may be a useful complement to Ainslie. Social norms and personal rules both involve self-control, and in both cases there are short-run temptations associated with the gains from not following the rule or respecting the norm.

1.5. Aim of project

While this dissertation supports Ainslie's theory, it also points out some places that could do with more detail, particularly with regard to our understanding of the will as compared to an iterated prisoner's dilemma game. Upon reading Bicchieri's account of social norms I find that suggesting that the will can be described in terms of an iterated prisoner's dilemma game, as Ainslie does, is not enough. Even though Bicchieri deals mainly with *social* norms, her ideas provide insight into what Ainslie has to say about *personal* rules, because the reason we follow social norms can be likened to the reason we follow personal rules in that following social norms like following personal rules could sometimes be the best motivational option to maximize long-term utility. We follow social norms to benefit from the advantages; and to avoid the negative consequences of not following. We will contemplate not following a social norm because following may contradict with our own immediate interests. But following a social norm is also an interest to the self (albeit a long-term interest): following the social norm could ensure that we gain the associated benefits (this reflects Ainslie's idea of the common goal). Thus, we see that social norms like personal rules are both tools for self-control in the preservation of the common goal in the face of temptation (and, thus, also the maximization of utility).

But social norms can be used to describe situations that aren't accurately described as iterated prisoner's dilemma games, whilst Ainslie limits the description of personal rules to this structure. Bicchieri provides a richer and more flexible account of the conditions for cooperation that is not tied to prisoner's dilemmas. I, thus, aim to show that Bicchieri's description of social norms beyond the confines of the prisoner's dilemma structure can apply to Ainslie's description of the will.

2.

AINSLIE'S THEORY

2.1. Introduction

This section addresses Ainslie's theory on self-defeating behaviour. In explaining why we make self-defeating choices by pursuing an *SS* reward over an *LL* reward, Ainslie observed the matching law which suggests that we discount hyperbolically as opposed to *Conventional Utility Theory's* proposition that individuals discount exponentially.¹⁹

2.2. The Matching Law: a brief overview

“The original behavioural theory of choice is the matching law (Herrnstein 1970) [...]” (Vuchinich & Heather 2003:2). To get a sense of how the matching law works, look at the following equations.

$$\frac{B_1}{B_2} = \frac{FR_1}{FR_2}$$

Equation 1

In the above equation, B_1 is the subject's response (behaviour – the action one takes or the move one makes) to reward option 1, and B_2 is the subject's response to reward option 2 whilst FR_1 represents the frequency of reinforcement (reward) received from reward option 1, and FR_2 represents the reinforcement received from reward option 2. This shows that behaviour is “distributed to the response options in direct proportion to the frequency of reinforcement received from those options [...]. Because the behaviour ratio 'matched' the reinforcement ratio, this relation became known as the matching law”

(Vuchinich & Heather 2003:3).

It was also discovered that *amount* and *delay* of a reward option could affect behaviour:

¹⁹ Refer to section 1.2. for a description of the *Conventional Utility Theory*.

The effect of reinforcement-amount on behaviour allocation

$$\frac{B_1}{B_2} = \frac{AR_1}{AR_2}$$

Equation 2

Here, B_1 and B_2 are as before, while AR_1 and AR_2 represent the amounts of reward received per reinforcement from reward options 1 and 2, respectively. This shows that behavioural allocation is in direct proportion to the amount of the reinforcement. But if there was a delay in receiving a particular reward our behaviour is not in direct proportion to the amount of reinforcement. This can be seen in *equation 3*, below.

The effect of reinforcement-delay on behaviour allocation

$$\frac{B_1}{B_2} = \frac{DR_2}{DR_1}$$

Equation 3

(Vuchinich & Heather 2003:3).

In equation 3, B_1 and B_2 are as before; DR_1 and DR_2 represent the delays of reinforcement from option 1 and 2, respectively. This shows that behavioural allocation is in inverse proportion to the relative delays of the reinforcement i.e. the greater the delay in claiming a reward, the less frequently we would pursue this reward over a reward that is available sooner.

These equations as derived from experimental observations in conjunction with other early experimental findings in behavioural allocation led to Herrnstein's formalisation of the matching law “as a general analytical framework for describing behavioural allocation to any activity in any situation” (Vuchinich & Heather 2003:3). The matching law results in hyperbolic discounting which, unlike exponential discounting, explains why individuals make short-sighted choices. This observation led Ainslie to substitute the exponential discount curve that the *Conventional Utility Theory* uses to describe individuals' preferences, with a more bowed hyperbolic discount curve. The hyperbolic curve is B in the graph below, whilst A is the exponential discount curve that it replaces:

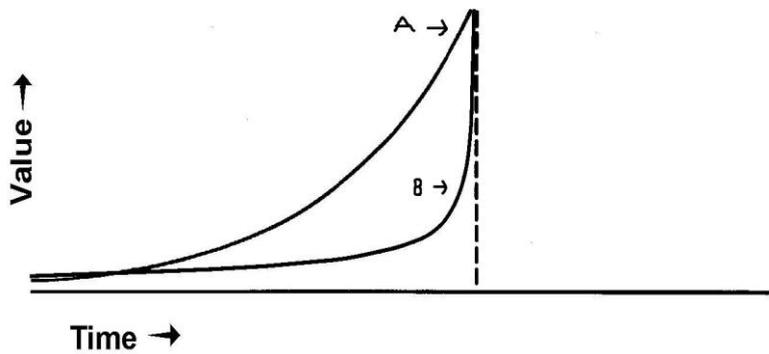


Figure 3

(Ainslie 2001:31).

2.3. The problem of Hyperbolic Discounting and possible solutions

To illustrate how hyperbolic discounting works, consider the following example:

We have the decision for tonight, to either:

(A) Stay up late and play computer games

OR

(B) Go to bed early.

Each option has its own respective reward and by choosing one reward, we automatically forgo the other that we did not choose.

Option *A* gives us the reward of staying up late (including the associated rewards of pleasure and entertainment etc) whilst option *B*, on the other hand, gives us the reward of rest. However, the reward from option *A* will last only for a few hours (i.e. while we are up and playing on the computer) whilst the reward from option *B* will last the whole of the next day. Therefore, in this regard, one may value option *B* more than option *A* in value. Nonetheless, right now, the game-playing is worth more to us

than that of a good night sleep (adding up to a full day of rest), however, we simultaneously realize that if we give in to our current desire for playing computer games, the future consequences of this choice would devalue that reward by making us regret our eventual choice because we will be tired; off our game; and ultimately unproductive the whole of the next day, which in comparison is a much larger sacrifice than forgoing a few hours of game-playing on the computer.

Right now when we are making the decision we see that *B* is worth more and, thus, at this moment we prefer to sleep early but as tonight rolls around and the time for claiming the less valuable reward comes around, we see the less valuable reward as more valuable and, thus, at that moment we then prefer *A*. Self-defeating behaviour is, thus, characterised by a *reversal of preference* in the face of temptation from a less valuable reward. This reversal of preference is explained by hyperbolic discounting.

Ainslie suggests that this indicates that if the hyperbolic discounter engages in regular trade with an exponential discounter, the hyperbolic discounter would be left in a perpetual state of economic loss. He illustrates this with the example of a winter coat serving as the sole commodity between the exponential and the hyperbolic discounters. The exponential discounter can get the hyperbolic discounter to sell her his coat every spring at a significant discount since winter would seem too far away for the hyperbolic discounter to wait to use his coat. And just before every winter, the exponential discounter could sell the coat back to the hyperbolic discounter at a profit since the coat may then seem more valuable to the hyperbolic discounter now that he needs it. So he could get R50 every spring from the exponential discounter but pay R80 for the same coat just before winter (essentially paying for something that was already his at one point); and instead of making any money would be continuously making a loss. The only protection against a trade with an agent that discounts exponentially is exponential discounting (Ainslie 2001:30-32). But, we know that our discount tendency is hyperbolic. How do we, therefore, ever manage to choose an *LL* reward in the face of temptation?

Ainslie suggests that we would benefit from finding ways to stick to our preferences at a distance in such a way that temptation would be unable to pull us away from the higher valued but delayed reward option, in favour of the *SS* reward option. Ainslie suggests four possible strategies of resisting temptation so to maintain stable preferences:

Extrapsychic Commitment is the placing of physical constraints upon ourselves that prevent us from straying, such as in the case of a recovering alcoholic attempting to avoid the temptation of alcohol by finding a route home from work that doesn't pass any bars or liquor stores. But it is not always possible to physically remove temptation (or to prevent oneself from giving in to the temptation of an *SS* reward); and even if one finds an effective constraint, circumstances may occur that necessitate change in preference; and such freedom to change a preference when necessary is not easily possible with this device. If one still prefers this strategy, in order to strengthen its effectiveness, we could also place side-bets which are more flexible than physical constraints, adding extra incentive that would be lost if we were to give in to our temptation: Going back to the recovering alcoholic, he could have a side-bet in addition to his „safe' route home, in the form of a sponsor such that if he does find himself off the wagon, he wouldn't only have to bear the consequences that that involves but also social consequences as a result of disappointing the sponsor.

Social side bets are much more flexible than physical commitments, but they too, are limited. For instance, they're useless against concealable impulses and against any impulse of which other people don't happen to disapprove; they would actually be counterproductive against any impulse to buy popularity. Furthermore, vulnerability to social influence has costs, especially in a cosmopolitan society, which multiplies a person's chances of meeting predators who would exploit this vulnerability. Despite these problems, it's a major strategy for people with strong motivations

(Ainslie 2001:75).

Manipulation of Attention suggests manipulating our attention so to avoid information that would change our original position. For instance, when faced with the temptation of fattening food, a dieter could focus her attention on other issues such as worrying about paying her bills etc. This, however, prevents us from basing our actions on unbiased information. In addition, this strategy serves short-term interests more effectively than long-term ones since we can't credibly plan to perpetually distract ourselves (Ainslie 2001:76).

Preparation of emotion suggests that: "If a person expects emotion to make an otherwise unpreferred reward temporarily dominant, he may commit himself not to choose the reward through early inhibition of that emotion" (Ainslie 2001:136). Ainslie doesn't exactly show why this isn't a great strategy but I think its weakness lies in the fact that we need to know that a temptation is going to

occur so to prepare for the emotion that temptation would spark and, thereby, think thoughts that disassociate with that temptation – basically thinking things to put us off that temptation. But we don't always know when a temptation is going to arise, so we can't always prepare our emotions for its arrival.

Ainslie looks for a strategy that is not limited to physical constraints like *extrapsychic commitment*; or one that serves short-range goals more effectively like *manipulation of attention*; or one that requires knowledge of temptation before it arrives so to prepare for the emotions it stirs like with *preparation of emotion*. This brings us to:

Personal rules – Willpower, which, according to Ainslie, “seems to be at once the strongest and most versatile [...]” (Ainslie 2001:89) of the four suggested strategies in that it involves resolving to stick to a choice by discouraging preference reversal (stabilizing preference choice towards the more valuable reward options because impulses are able to be resisted). This strategy suggests that we can choose *categorically* (or according to principal), which means that our current choice is taken as a predictor of how we may act when faced with such a choice again. The accumulated reward value, over time of failing to choose the larger but delayed reward option, could be too great to lose out on; as can be illustrated in the demonstrative consideration of a life-time of feeling tired versus a few hours of pleasure from playing computer games. What we would have to do to accomplish this foresight is *bundle* the rewards over extended time.²⁰ “As with more discrete moments of reward, bundling these experiences into series moves our incentives toward the larger, later rewards. So choosing behaviours in whole categories will lead to less impulsiveness” (Ainslie 2001:84). Thus, we could make our decisions on principle rather than impulse. This strategy, according to Ainslie, can be described in terms of an iterated prisoner's dilemma game between successive selves over alternate interests where we judge what we will do in future games based on how we play now. It is, thus, the reflection of our current choice as indicative of other choices we will make in the future, that can motivate us to forgo game-playing in favour of going to bed early.

But, although we can be motivated to go to bed early, the temptation of the game-playing is not removed. One may still be inclined to justify indulging in that temptation by making an *exception*. Ainslie acknowledges that people may try to manipulate themselves out of keeping to personal rules by allowing for exceptions. This is where we make an exception to the rule by giving ourselves

²⁰ Refer to section 3.1. for more details on ‚bundling‘.

special permission to choose poorly this time. We could perhaps say: “Today's my birthday; I'll stay up late and play on the computer today”. But then tomorrow comes around and although it may not be our birthday we see another excuse to play, perhaps we're feeling depressed and say: “I'll play computer games today because I am sad and need cheering up”. The problem with exceptions becomes apparent. Such justifications are not breaking the rule per se, but at which point should we draw the line to exceptions? Because if we fail to do so effectively we would undermine the rule and lose the reward it promises. Exceptions over time can erode the rule without breaking it. The will

...is most threatened by rationalizations that permit exceptions to the choice at hand and is most stabilized by finding bright lines to serve as criteria for what you'll view as cooperation. A personal rule never to drink alcohol, for instance, is more stable than a rule to have only two drinks a day, because the line between some drinking and no drinking is unique (bright), while the two-drinks rule doesn't stand out from some other number and is thus susceptible to redefinition. However, skill at intertemporal bargaining will let you attain more flexibility by using lines that are less bright. You can observe a rule to discount exponentially some relatively countable kinds of goods, like money, as long as you don't attempt too abstemious a rate

(Ainslie 2001:104).

Thus, the will seems to be the most effective tool against self-defeating behaviour if it is followed effectively, realizing the potential damage exceptions could create and, thereby, not indulging in them.

3.

AINSLIE'S PERSONAL RULES (THE WILL): A CLOSER LOOK

3.1. Introduction

This section revisits the concept of the will introduced in section one and developed in section two, offering a comparative analysis of the will in relation to iterated prisoner's dilemma. The will is the most mysterious of the four devices Ainslie suggests against self-defeating behaviour because although people tend to attribute the successful resistance of temporary preference to 'willpower' over and above the other devices, there is still uncertainty about how exactly the will manages to commit us to stick to a resolution and not give into temptation. "Just resolving" to choose an *LL* reward doesn't guarantee that the *SS* temptation will be resisted. So how does the will work; how does it encourage us to forgo the tempting *SS* reward in favour of the better *LL* reward? As previously indicated, Ainslie emphasises the bundling factor where, according to his description of the will, we bundle our rewards over time (as depicted in the graph below), adopting the personal rule to behave alike to all members of the same category (thereby choosing categorically or according to principle).

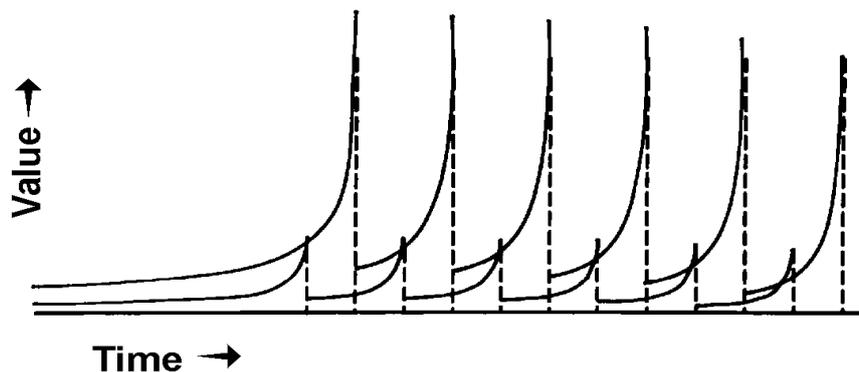


Figure 4: Summing hyperbolic curves from a series of later-larger rewards and a series of smaller-earlier alternatives encourages preference stability now (i.e. at the beginning of the series) as a curve-crossing here can jeopardize the series, prompting like behaviour in the following part of the series but as the series, draws to an end the curves from the final pair of rewards are the same as in *Figure 2* in section 1.

(Ainslie 2001:83).²¹

²¹ See section 1.2 for Figure 2.

Time in the above graph progresses from right to left and if we look at the first part of the series on the extreme right, it represents our current choice. We know that as hyperbolic discounters, when faced with a current choice, we will temporarily reverse our preferences from the previously preferred *LL* reward to the currently looming *SS* reward as is marked by the curve crossing. But if we bundle our preferences over time (across a series of the same pair of choices) and we make our current choice representative of all such future choices such that how we choose now will be indicative of how we will choose every time in the future when faced with the same choice, we are now able to resist the temptation of reversing our preferences. This is indicated by the diminishing of the curve crossing as the series progresses and by the time we reach the extreme left of the graph we see that preference reversal curbs. This means that when we choose categorically, we would prefer the *LL* reward every time. Although the temptation is never removed (the *SS* reward always remains tempting), the fact that we see our current choice as representative of the entire bundle such that the entire bundle is at stake if we choose poorly now, motivates us to resist temptation as the current temptation of the *SS* reward is not equivalent to the worth of the entire bundle in terms of utility.

3.2. Personal Rules and Iterated Prisoner's Dilemma: A Comparative Analysis

Hyperbolic discount curves create a relationship of partial cooperation or limited warfare, among your successive motivational states. Their individual interests in short-term reward, combined with their common interest in stability of choice, creates incentives much like those in the much studied bargaining game, repeated prisoner's dilemma. Choice of the better long-range alternative at each point represents cooperation, but this will look better than impulsive defection only as long as you see it as necessary and sufficient to maintain your expectation that you'll go on cooperating in the future...this intertemporal bargaining situation is your will

(Ainslie 2001:104).

According to Ainslie, personal rules operate in a situation that is like a game of iterated prisoner's dilemma.²² But iterated prisoner's dilemma deals with competing individuals that can actively reward or punish each other in successive rounds whilst personal rules describe the relationship in an individual with competing interests.

²² See section 1.4.1 on iterated prisoner's dilemma.

Revisiting Axelrod (1984), we recall that in trying to work out conditions for the occurrence of cooperation, he held an iterated prisoner's dilemma computer tournament.²³ Dawkins (1989) explains that 14 strategies were submitted and Axelrod added one more, called *Random*, which works by playing cooperate and defect randomly, and served as a kind of baseline 'non-strategy': if a strategy can't do better than *Random*, it must be quite bad (Dawkins 1989:208).

Axelrod translated all 15 strategies into one common programming language, and set them against one another in one big computer. Each strategy was paired off in turn with every other one (including a copy of itself) to play Iterated Prisoner's Dilemma. Since there were 15 strategies, there were 15 X 15, or 225 separate games going on in the computer. When each pairing had gone through 200 moves of the game, the winnings were totalled up and the winner declared.

(Dawkins 1989:208-209).

The winning strategy was the one which accumulated the most money/points summed over all its 15 pairings according to $T > R > P > S$ where if as according to the following scoring, $T = 5$, $R = 3$, $P = 1$, and $S = 0$, a maximum possible score would be 15000 (200 rounds of 5 points per round for 16 opponents, including a copy of itself), and a lowest possible score would be 0 (200 rounds of 0 points per round for 16 opponents, including a copy of itself.) But neither was achieved. "The most that a strategy can realistically hope to win in an average one of its 15 pairings cannot be much more than 600 points. This is what two players would each receive if they both constantly cooperated, scoring 3 points each of the 200 rounds of the game" (Dawkins 1989: 209), and if one strategy defected, it would likely end with fewer than 600 because of retaliation by the other player (most of the other strategies had this retaliatory behaviour built into them). As such 600 was used as a 'benchmark' of sorts for the game (Dawkins 1989:209).

As briefly noted earlier, in section 1, the *Tit for Tat* strategy had won the tournament. Against another *Tit for Tat* strategy, the 'benchmark' score of 600 would be reached as no other move would be made by each player through every round than Cooperate. Against a strategy like *Random* (plays cooperate but randomly defects), *Tit for Tat* would copy that defection in the following round and what *Random* won in the previous round through its temptation to defect is lost via *Tit for Tat's* copied defection in

²³ Strategies, here, are in form of preprogrammed rules of action (Dawkins.1989/208).

the subsequent round. *Random* would return to its cooperative strategy and defect randomly; every time it does, causing *Tit for Tat* to retaliate in the subsequent round. And they will continue in this manner till the end. This causes a major decrease in the 600 split reward each strategy would have gotten had they both cooperated without defecting. This is also what happens when *Tit for Tat* plays against a copy of itself. But another strategy like *Remorseful Prober* (not used in the tournament but, according to Dawkins, useful to think about) which allows for an opponent to defect once without retaliation, but if the opponent defects not only in one round but the round that immediately follows as well, *Remorseful Prober* retaliates. This 'remorseful' allowance of one free defection before retaliating breaks some runs of alternating recrimination. Against *Tit for Tat* runs of would be recrimination are scotched. Most of the game is spent in mutual cooperation and *Remorseful Prober* does better against *Tit for Tat* than *Random* but not as well as *Tit for Tat* against itself (Dawkins 1989:11).

Classifying the strategies into categories, Axelrod noticed that what he called 'nice' (never the first to defect), 'retaliatory' (defect only in retaliation when one's opponent had defected in the previous move), 'forgiving' (having a short memory it punishes only in retaliation and, thereafter, cooperates) and 'non-envious' (not wanting to do better than one's opponent) strategies were the top achievers gaining the most points in comparison to their 'nasty' (defects without being provoked), 'unforgiving' (having a long memory, if defected against, even once, will always, thereafter, defect, even if it began by cooperating) and 'envious' (wanting to do better than their opponent) opponents (Dawkins 1989:212).²⁴ "The reason unforgiving strategies don't do very well is that they can't break out of runs of mutual recrimination, even when their opponent is 'remorseful'" (Dawkins 1989:212). If *Tit for two Tats* (begins by cooperating and allows two defections in a row to an opponent before retaliating) was added to this tournament, although 'saintly nice', it would have won because it is very good at avoiding long runs of mutual recrimination (Dawkins 1989:212).

Axelrod then announced a 2nd tournament where he this time received 62 entries and again added *Random*, making 63 strategies running in the tournament. This time, however, the number of rounds for each game was no longer fixed at 200 but left open such that the benchmark was no longer 600; however, percentage results were instead calculable. The people who sent in the strategies were given the results of the first tournament and Axelrod's analysis that nice strategies did better than nastier ones, and if *Tit for two Tats* had been submitted, it would have won. With this information, some of the programmers submitted nice and forgiving strategies (one even submitting *Tit for two Tats*), reasoning that these were winning qualities. Other programmers assumed that most of the other

²⁴ See section 3.2 for a more on 'nice', 'retaliatory', 'forgiving' and 'non-envious' strategies in Axelrod's tournament.

participants would submit nice and forgiving strategies based on Axelrod's information and as such they submitted nasty strategies to take advantage, "trying to exploit these anticipated strategies" (Dawkins 1989:213).

In this tournament, *Tit for Tat* was once again the winner, scoring 98% of the benchmark score; and all the other submitted nicer strategies in general did do better, where all but one of the nastier strategies ranked lowest, and all but one of the nicer strategies were top scorers. And although *Tit for two Tats* would have won had it been submitted in the 1st tournament, it didn't in the 2nd, "because the field now included more subtle nasty strategies capable of preying ruthlessly upon such an out-and-out softy" (Dawkins 1989:213). This explains why *Tit for two Tats* not only didn't win in this tournament but how it also managed to score quite low in ranking order of all the strategies at play. This strategy was simply too forgiving and was, thus, exploited by the presence of the increased number of nastier strategies.

This underlines an important point about these tournaments. Success for a strategy depends upon which other strategies happen to be submitted.

(Dawkins 1989: 213).

The strategies people submitted in these tournaments were arbitrary in that *Tit for Tat* happened to win in this created climate where most of the submitted strategies were nice.²⁵ If most were nasty, it couldn't survive, as such a climate would not have enough nice opponents to benefit from (Dawkins 1989: 215). But Axelrod suggests that cooperative strategies can still flourish in a climate that is dominated by nasty strategies, if the nice strategies meet other nice strategies often enough to prosper from the mutually cooperative relationship (Dawkins 1989: 219).

But this would only work in a game that is repeated and the players must not know that the present game is their last one i.e. what Axelrod refers to as 'the shadow of the future' must be long. So, if two opponents, playing a game of iterated prisoner's dilemma know the number of rounds they will play; they would perceive the last round of the game as a once-off game of prisoner's dilemma, and that the best move would, thus be to defect. But then the round before that last round will also become a

²⁵ It is arbitrary in that *Tit for Tat* just so happened to win the tournament in this case, its success determined by the climate which could have just as easily been dominated by nasty strategies, thereby, changing the winner of the tournament, which in such case would no longer be *Tit for Tat*, but something nasty.

once-off game with the same consequence, and so on up to the first round. So knowing the amount of rounds in a game (i.e. knowing when the game will come to an end) could cause the opponents to reason that they both could do nothing better than defect in every round (Dawkins 1989:216-224).

During the 1st World War, it was observed that enemy soldiers, although having opportunity to attack one another, sometimes exercised restraint. Axelrod describes a well known example of such restraint which occurred during war-time at Christmas where “British and German troops briefly fraternized and drank together [...]” (Dawkins 1989:225). Because the war was on-going with no end in sight and because they did not know if and when they would each be called to leave their respective trenches (i.e. because the shadow of the future was long), these soldiers “apparently believed in the policy of 'live-and-let-live’” (Axelrod 1984:74), which is a form of the *Tit for Tat* strategy. The individuals of each trench did not want to die and they knew if they attacked the other trench, then that trench would retaliate. Thus, given their uncertain futures (i.e. not knowing when the war – game – would come to an end) each trench, knowing if they initiated an attack this could possibly lead to their own demise, got caught in a stale-mate of sorts with each other to protect their own lives.

Like in a game of iterated prisoner's dilemma where bargaining agents with incompatible interests can share some interests, an individual's competing interests can also share a common goal (*limited warfare*).

...among agents engaged in limited warfare with each other, there's a practical mechanism for peace: Their mixture of conflicting and shared motives creates the incentive structure of a well-studied bargaining game, the “prisoner's dilemma”.

(Ainslie 2001: 90-91).

For the sake of preserving the common interest shared by competing interests, partial cooperation among our successive states is prompted by our hyperbolic discount curves:

“...personal rules, represent self-enforcing contracts with your future motivational states; such contracts depend on your seeing each current choice as a precedent that predicts how you're apt to choose among similar options in the future (Ainslie 2001:89).

Here, Ainslie suggests that the behaviour associated with personal rules can predict future behaviour in the same way as experience in an iterated prisoner's dilemma can give evidence about how an opponent is likely to play.

Although Ainslie does deal with the issue of strategies and how this can dictate the outcome of a game, his focus on the will being like a game of iterated prisoner's dilemma by making current choice predictive of future behaviour is constrictive. The will isn't simply an iterated prisoner's dilemma. Against a player who plays *Always Cooperate*, a self-interested player would do better by always defecting as that could give him a greater payout than any other strategy he could pursue. Here, *C* is not preferred by the player inclined to play *Always Defect* because his opponent is too nice and too forgiving.

If we had a *Random* strategy against a *Tit for Tat* strategy such that the *Random* is played by the current self and *Tit for Tat* is played by the future self, *Random* can recognize that he loses more in the long-run (from the fact that current moves are taken to predict future moves) than if he just played like his opponent and cooperated from the beginning. Thus, if the current self is able to break his *Random* strategy, he has incentive to cooperate with his cooperative future *Tit for Tat* self. So if we are playing to maximize our long run utility, we learn to modify our respective strategies, where *Random* could learn to play like a *Tit for Tat* strategy.

This discussion of various prisoner's dilemma strategies as compared to the will, thus shows that the will isn't simply described in terms of an iterated prisoner's dilemma but an iterated prisoner's dilemma with mutually cooperative strategies (or at least if mutual cooperation has not yet been reached, it is encouraged by the fact that current choices are taken to predict future choices and knowing they could get more in the long run by cooperating).

In interpersonal games, people deter even small defections by going out of their way to punish them, sometimes at a greater cost to their own interests, but you have no way to reward or punish a past self. This is true of course. But successively dominant interests do have stakes in each other's behavior that are very close to the ones in a literal prisoner's dilemma [...].

(Ainslie 2001:92-93).

So whilst our successively dominant interests are in a state of limited warfare sharing conflicting and common goals, the earlier discussed strategies such as *Random*, *Tit for Tat* etc, don't have a stake in their opponent's behaviour which is why our *SS* interest and our *LL* interest wouldn't follow any one of these strict strategies. The current self would have a stake in the future self's behaviour such that by giving in to temptation, the current self although gaining the *SS* reward, also loses out as the *LL* reward is forgone. This limited warfare relationship is what encourages cooperation towards the *LL* reward and not the fact that it is part of some pre-set strategy.

In iterated prisoner's dilemma, defection is discouraged due to the threat of retaliation by an opponent but when it comes to successively dominant interests (i.e. interests that are dominant at different temporal stages – now versus later), the past self can't literally be punished by the future self but these interests do have stakes (i.e. something to lose or gain) in each other's behaviour. “The threat that weighs on your current self's choice in a repeated prisoner's dilemma is not literally retroactive retaliation by a future self, but the risk of losing your own current stake in the outcomes that the future selves obtain” (Ainslie 2001:93). “Like successive motivational states within a person, each successive player has a direct interest in the behavior of each subsequent player [...]” (Ainslie 2001:93).

I do agree with Ainslie's comparison of the will to an iterated prisoner's dilemma game, however, I think that there are details about the will in relation to a prisoner's dilemma which Ainslie doesn't consider. “Ainslie's emphasis on [prisoner's dilemma] as the basic games among the interests seems exaggerated. In a complex legislature populated with many interests, the range of games that will be going on at any one time will typically be large [...]” (Ross 2005:341). I, thus now turn to Bicchieri's account of social norms to better illustrate the will, for the link between the will and social norms can provide a broader understanding of the will.

4.

BICCHIERI'S THEORY

4.1. Introduction

In *The Grammar of Society*, Bicchieri (2006) offers an analysis of the factors that determine when a social norm will be respected. Since there are costs from following norms, and gains from violating them and vice versa, social norms can be seen to share more than a few similarities with personal rules, particularly the comparison to prisoner's dilemma that each thinker makes with regard to social norms and personal rules respectively. I, thus suggest that Bicchieri's account is a useful complement to Ainslie.

Bicchieri describes social norms as informal codes of conduct that are typically public and shared and to a large extent commonly known and practiced by members of a society. However, such codes of conduct tend not to be enforceable by formal/legal sanctions. If there are sanctions, they could be informal and are likely only to bring about social consequences such as in the form of ostracism by society at large against a transgressor.

We can, thus see that the choice to obey or disobey a social norm is essentially a choice between an *LL* reward and an *SS* reward; and as such we see the similarities between social norms and Ainslie's personal rules. Following a particular social norm like returning a favour, for example, is like following the personal rule to behave alike to all members of the same category, both of which represent the *LL* reward (whereas not following would represent the *SS* reward as although we do gain something from not following, what we gain is not as valuable, in the long run, as following would be) and in so pursuing is worth greater utility than any rewards one would get from not following the social norm or the personal rule, respectively.

4.2. Social Norms and Iterated Prisoner's Dilemma

Bicchieri maps out the following conditions for social norms to exist:

Conditions for a social norm to exist

Let *R* be a behavioral rule for situations of type *S*, where *S* can be represented as a mixed-motive game. We say *R* is a social norm in a population *P* if there exists a sufficiently large

subset $P_{cf} \subseteq P$ such that, for each individual $i \in P_{cf}$:

Contingency: i knows that a rule R exists and applies to situations of type S ;

Conditional preference: i prefers to conform to R in situations of types S on the condition that:

(a) *Empirical expectations*: i believes that a sufficiently large subset of P conforms to R in situations of type S ;

and either

(b) *Normative expectations*: i believes that a sufficiently large subset of P expects i to conform to R in situations of type S ;

or *Normative expectations with sanctions*:

(b') i believes that a sufficiently large subset of P expects i to conform to R in situations of type S , prefers i to conform, and may sanction behavior.

(Bicchieri 2006:11).²⁶

This means that:

the very existence of a social norm depends on a sufficient number of people believing that it exists and pertains to a given type of situation, and expecting that enough other people are following it in those kinds of situations. Given the right kind of expectations, people will have conditional preferences for obeying a norm, meaning that preferences will be conditional on having expectations about other people's conformity. Such expectations and preferences will result in collective behaviors that further confirm the existence of the norm in the eyes of its followers.

(Bicchieri 2006:2).²⁷

²⁶ A mixed motive game is a game where there is conflict of interest but also a potential for a joint gain among the players of the game (Bicchieri 2001:3). According to Bicchieri, social norms solve mixed-motive games (by transforming them into coordination ones – to be addressed, shortly).

Fear of punishment via sanctions for the violation of norm as well as others' expectations contribute to norm following. Sanctions are punishment for failure to play as others prefer.

Refer to section 5.

But expectation does not necessitate our conformity, although it does encourage it. In many cases we may behave in a certain manner whether or not others expect us to do so; their expectation doesn't dictate our behaviour; rather in such a case, our own preference guides our behaviour. Thus, although expectations and beliefs can be good indicators of likely behaviour, we may not be certain of what any given individual will do next.

Although nothing concrete guarantees our cooperation with a particular social norm, Bicchieri recognizes the importance of our varying motivations which may significantly contribute to the level of conformity to a social norm. Like Ainslie, Bicchieri uses the prisoner's dilemma game structure (amongst others) in her descriptions to demonstrate the significance of our varying motivations.²⁸ She uses different one-shot dilemma scenarios to depict different types of selves (namely, a self-interested, benevolent, altruistic and norm-follower self). Let us look at her portrayal of the self-interested perspective as an example:

	Others		
	C	D	
C	S	W	
D	B	T	Self

One-shot prisoner's dilemma from the perspective of narrowly self-interested self.

(Bicchieri 2006:17).

For a person whose motivation is self-interest, in a game of prisoner's dilemma, the dominant strategy

²⁷ Bicchieri like Ainslie also recognizes the role of exceptions where we would try to make it seem like the rule doesn't apply: "norms are understood to apply to classes or families of situations, not to every possible situation or context" (Bicchieri 2006:12). We could say that this situation is unique or unusual and does not call for the following of a social norm and the same could be said if we did not want to follow a personal rule. "Situational contingency explains why people sometimes try to manipulate norms by avoiding those situations to which the norm applies [...] or by negotiating the meaning of a particular situation" (Bicchieri 2006:12-13).

²⁸ Refer to section 4.2 for more on these other game types.

would be defect. This player would value the pay-off according to: $T > R > P > S$ (similar to the valuing of the once-off game of prisoner's dilemma), such that DC is the best (B) outcome; CC is 2nd best (S); DD is 3rd best (T); and CD is worst (W).²⁹

When there are social norms, the situation is an equilibrium. “An *equilibrium* is a situation that involves several individuals or groups, in which each one's actions is a best reply to every one else's action” (Bicchieri 2006:22). A particular social norm would, thus be an equilibrium when our belief that that norm exists and that others follow that norm and expect us to follow that norm is satisfied such that we do likewise follow the norm (which is the best reply we can give to their following and expectancy of us to likewise follow i.e. cooperate as, here, an outcome of CC is preferred). But if we expected others not to follow a norm, and we too didn't accordingly follow that norm, this too is an equilibrium; and in such a case DD is preferable in comparison to any other outcome. But an existing social norm wouldn't necessarily be an equilibrium in a prisoner's dilemma (as a self-interested player wouldn't follow the norm if it goes against his immediate interest) in that a self-interested player may not be cooperative; while other individuals cooperate, he may play to cater to his interest by defecting from the norm.

The following of social norms is not always compatible with our self-interest.³⁰ For instance, we may not want to follow the norm of reciprocity by returning the favour of lending money because it may go against our interest to increase our utility or minimize obligatory efforts. But we could prefer to follow the norm if the conditions have been fulfilled (as not following when conditions have been met could lead to negative consequences such as ostracism or perhaps not receiving assistance from a player in the future who cooperated with us in the past). Social norms, thus transform a self-interested prisoner's dilemma game (such as the one depicted in the one-shot prisoner's dilemma from the perspective of narrowly self-interested self) into one of coordination where the preferred outcome is one of mutual cooperation. This is because if the conditions of a social norm to exist have been met, they change our preferences such that the preferred outcome would now be in favour of maintaining a utility maximising relationship with our opponent.

If our immediate self-interest goes against what a social norm prescribes, yet the conditions of the social norm have been fulfilled; our preference will change from the desire to fulfil our self-interest to

²⁹ See section 1.4 on prisoner's dilemma for a key to this value scheme.

³⁰ This is similar to Ainslie's idea of impulsive behaviour which may not be compatible with one's long-term interest.

the desire to follow the social norm and in so doing we have transformed our self-interested prisoner's dilemma game to one of coordination. If following social norms can extend to such a game structure, beyond prisoner's dilemma, and if following personal rules is like following social norms, we could, thus, likewise, extend the following of a personal rule beyond a game of prisoner's dilemma. So, similarly, we can say that the fact that our immediate self-interest may go against a personal rule when faced with an *SS* reward, the fact that we have employed a personal rule in the first place indicates that we have an expectation to follow it, and as such despite being faced with a temptation, our preferences change from that desire to satisfy that immediate self-interest to that of following the personal rule and in so doing our prisoner's dilemma game transforms to one of coordination.

Others

	C	D
C	S	W
D	B	T

Self

Coordination Game

(Bicchieri 2006:26).³¹

Here, each player would value pay-outs as follows: $R > P > T > S$ (similar to an iterated prisoner's dilemma), where the best outcome (B) for both players is mutual cooperation, the second best for both players (S) is mutual defection, third best for both players (T) is their giving in to the temptation to defect against the opponent's cooperation, and the worst for both players (W) being the sucker's pay-off where a player cooperates against his opponent's defection. This differs from the ranking of a self-interested player i.e. $T (DC) > R (CC) > P (DD) > S (CD)$. Social norms are an equilibrium of this new "transformed game it *creates*" (Bicchieri 2006:27).

³¹ Bicchieri says that a coordination game is a game in which there are at least two Nash equilibria in pure strategies, and players have a mutual interest in reaching one of those equilibria (*CC* or *DD*), even if different players may prefer different equilibria (Bicchieri 2006:26). This suggests that preference ranking would not only be *CC, DD, TS, ST* but also *DD, CC, TS, ST*. But if dealing with norm followers, they would prefer the former ranking as this would accommodate their goals more effectively than *DD, CC, TS, ST*.

5.

ITERATED PRISONER'S DILEMMA, AINSLIE'S PERSONAL RULES AND BICCHIERI'S SOCIAL NORMS

5.1. Introduction

There are several main ways in which Ainslie's theory of personal rules can compare to Bicchieri's account of social norms. A comparative analysis, thus, suggests that if the latter can be explained beyond iterated prisoner's dilemma, as Bicchieri describes it, perhaps so to can the former. And, since Ainslie confines his description of personal rules to that of an iterated prisoner's dilemma game, it is useful to explore the ways in which Bicchieri's ideas can be analogous to Ainslie's, so to demonstrate how Bicchieri's explanation can fit and extend Ainslie's description.

5.2. How social norms compare to personal rules and what this analysis reveals

As described by Ainslie and Bicchieri, we can find structural similarities between personal rules and social norms in that both Ainslie and Bicchieri illustrate personal rules and social norms, respectively, as tools for self-control with regard to the maximization of long-term utility in the face of a short-term temptation whether, as in Ainslie's description, an impulsive choice goes against the interest of a future self pursuing an *LL* reward, or, as in Bicchieri's case, the pursuit of a selfish interest (which is like an impulsive choice) goes against the combined interest of the norm-following individuals of society (which is like an *LL* reward).³² But whilst personal rules facilitate such a relationship (of striving towards long-term utility maximization) between the successive interests of the self where personal rules operate as such a tool for self-control by discouraging impulsive behaviour due to the bundling function of personal rules where the risk that this function attributes to temporary preference is portrayed as something too great to chance losing; following social norms facilitates such a relationship between a norm-following individual and the norm-following individuals of society where following social norms similarly act as a tool for self-control by discouraging a self-interested pursuit that goes against a social norm.

³² If a personal rule is in place, acting impulsively could also apply to a weak will due to an individual not placing a high enough value on the bundle or perhaps due to the excuse of exceptions. So it can also be the failure to follow a personal rule that can be attributed to a weak will.

For both Ainslie and Bicchieri, current behaviour tends to predict likely future behaviour and as such indicates to all participants in a situation how to respond such that if one player behaves negatively, another player can expect that an opponent may respond to that negative behaviour negatively as well. Thus, since current behaviour (whether in the case of following or failing to follow a social norm or a personal rule) is taken to indicate likely future behaviour, we may be inclined to act positively now and cooperate with our opponent so as to encourage a favourable response from that opponent as only favourable responses would serve to maximize our utility in the long run.

We could choose not to follow a social norm if it clashed with a current personal interest (this would typically conflict with society's interest). It is much like the failure to consistently pursue an *LL* reward due to hyperbolic discounting. Thus, when acting „selfishly‘ (where we fail to follow a norm) the norm-following individuals of society lose out due to our selfish behavior, and consequently we potentially lose out in the long run in terms of utility as even though this choice would immediately gain us some reward for not following, the value of this reward is not nearly high enough in comparison to the loss we will suffer in the long run for not following the social norm.

Thus, as we can expect to get punished by society (a possible condition of norm-following and a consequence of not) if we fail to follow a social norm we can similarly expect punishment for failure to cooperate or follow a personal rule where the punishment would be possible risk to the common goal shared by the successive interests of the self.

We see that both personal rules and social norms make the tempting *SS* reward less appealing in comparison to the *LL* reward and in doing so motivates cooperation in a game because for both personal rules and social norms following promise more over time than not.

Also, both Ainslie and Bicchieri account for exceptions to their tool's success. For Ainslie this is where we make an exception to the rule by giving ourselves special permission to choose poorly 'this time'. Thus, the problem with exceptions is that we can always find an excuse to break away from a personal rule; and soon enough we may break away from it entirely as if the personal rule wasn't in place at all, and we'll be back to square one, trapped in a cycle of temporary preference that undermines utility maximization potential. For Bicchieri, exceptions would be to make it seem like the norm doesn't apply to the situation where one could say that 'this situation' is unique and does not

call for the following of a particular social norm. But again, if like with personal rules, we continue to do this with regard to a particular social norm, we may undermine our tool for self-control. Knowing that exceptions tend to do this, we can, thus, curb our employment of them.

Bicchieri suggests that following social norms convert games that are self-interested to those of coordination where plays of mutual cooperation can thrive, as this could bring us greater utility in the long run against a norm-following (cooperative – and retaliatory – in the form of sanctions) opponent (representative of individuals of society) than defection, as this may lead to negative consequences such as punishment via sanctions etc.

Similarly, we could say that following a personal rule could 'convert' inclinations towards impulsive behaviour (which is like any self-interested game Bicchieri refers to that may go against a social norm) to a game where plays of mutual cooperation between the successive, competitive interests of the self can thrive.

These similarities show us that personal rules and social norms are similar to the extent that both are tools for self-control aimed towards maximising our utility potential. Based on this, I think personal rules can also extend beyond iterated prisoner's dilemma; we can infer that likewise, the former can be described as such.

Bicchieri uses prisoner's dilemma to indicate the motives for following a norm so why we follow a social norm is like a prisoner's dilemma whereas for Ainslie, the following is like an iterated prisoner's dilemma or rather, more specifically, it's the successive interests playing against each other where one player (interest) employs the personal rule to attempt to keep the second player (*SS* interest) in line (by not pursuing the *SS* reward) by putting the common goal at risk.

In prisoner's dilemma, in the pursuit of self-interest, rational players make opponents worse off than if they had themselves cooperated. Regardless of what the opponent does, defecting would always put the opponent in a worse position than cooperating. This is because each is more affected by the opponent's move than their own move as each payer gains more by participating in a programme of mutual assistance than by acting independently as they both need each other to assist by exercising

self-control from its individually rational choice (Snidal 1985). Thus, cooperation is a favourable option because both players gain more from both cooperating than not cooperating. But, here, in order for the iterated prisoner's dilemma to truly describe the use of the will, the outcome should be one of mutual cooperation so to reap the benefits of a mutually cooperative relationship. But since iterated prisoner's dilemma can host a number of different strategies that players can opt for where the outcome from those plays is not necessarily that of mutual cooperation, Ainslie's comparison becomes very limiting, as the understanding of that becomes restricted to this definition where the will (or rather the successful use of personal rules) is specifically not just an iterated prisoner's dilemma game but an iterated prisoner's dilemma game with a long shadow of the future where both players play this specific strategy (i.e. whether being nice, forgiving and/or unenvious such as what would be the case if both players were playing *Tit for Tat*, resulting in both players playing „cooperate') perpetually, resulting in this specific outcome (of mutual cooperation).

For Bicchieri, not everyone has to conform to a social norm (definition of a social norm), but for iterated prisoner's dilemma/personal rules, all players should cooperate. But here, the only one doing the work and sacrificing, is the current self who wants the *SS* reward and overcomes it for the sake of the common goal of the *LL* reward. The future self who wants the *LL* reward as well doesn't really have a role to play aside from maintaining the pursuit of the *LL* reward which I suppose is enough to qualify as cooperating too. Unlike Ainslie, who likens the will to the strict definition of an iterated prisoner's dilemma game, Bicchieri's description of social norms allows greater room to be lax.

Snidal (1985) uses a graduated version of the prisoner's dilemma game (which is a modified version of the prisoner's dilemma game; and can be seen in the table, *Graduated form of Prisoners' Dilemma*, below) where the sub-games defined by the two extreme strategies for each player is the same as it appears in a two-choice/two-player game, and the intermediate choices occur between those two extremes. And for any choice made by one player, the player makes himself better off and his opponent worse off by choosing less cooperative strategies and the same is true for the opponent, given any choice made by the player. This is a significant feature of graduated prisoner's dilemma that every sub-game (as defined by considering any two choices for each player) is also a prisoner's dilemma. Thus, the strategic structure of an issue is not altered by looking at gradations of strategies i.e. Prisoner's dilemma is the same in the small as it is in the large. This is because prisoner's dilemma falls into the category of separable games where the effect of each player on the other can be assessed independently of what the other does (Snidal 1985:927-928). But, despite the structure of the game remaining the same when including intermediate options, it is transformed in two ways. Firstly there are more cooperative outcomes (unlike in the 2x2 game) that could occur. "In the simple game

there is a single cooperative and efficient outcome at the top left hand corner (3.3). But in the graduated game there is a larger set of available cooperative (and Pareto-efficient) outcomes as represented by the dark line segment JKL. Although agreement at (3.3) may seem compelling, the way the game is set up, either player may attempt to bargain for a better outcome along JKL, introducing new complications to impede cooperation” (Snidal 1985:928). Secondly, another way that the game is transformed by the introduction of intermediate options, is when unlike in a simple game, graduated options allow players to attain intermediate levels of cooperation in conditions in which they are unwilling to risk full cooperation because they cannot accept any possibility of receiving their worse outcome in the event that the other player does not cooperate. In graduated prisoner’s dilemma, players may be able to achieve intermediate levels of cooperation where the outcome if the other does not cooperate is not as costly. But despite the differences, whether simple or graduated, the basic structure is the same (Snidal 1985:928).

Graduated form of Prisoners’ Dilemma

		Player 1				
		.0	.25	.5	.75	1.0
Player 2	.0	3.0, 3.0	2.5, 3.3	2.0, 3.5	1.5, 3.8	1.0, 4.0
	.25	3.3, 2.5	2.8, 2.8	2.3, 3.0	1.8, 3.3	1.3, 3.5
	.5	3.5, 2.0	3.0, 2.3	2.5, 2.5	2.0, 2.8	1.5, 3.0
	.75	3.8, 1.5	3.3, 1.8	2.8, 2.0	2.3, 2.3	1.8, 2.5
	1.0	4.0, 1.0	3.5, 1.3	3.0, 1.5	2.5, 1.8	2.0, 2.0

(Snidal 1985).³³

The extension of two players to more is such that each player imposes costs or benefits on others independent of their own behaviour. In terms of ordinal preferences, every player is in the same symmetrical relation to every other player (Snidal 1985:928).

The two standard results from n -actor prisoner’s dilemma are: that larger numbers of players inhibit cooperation; and, secondly, that asymmetries facilitate cooperative and efficient outcomes.

³³ 0.25 = „Co-operate 0.25 of the time.

Another limitation of a 2x2 prisoner's dilemma game is its static nature. How long an issue is expected to carry on into the future influences cooperation, as does the present time which is shown in how quick adjustment occurs in responding to other players' choices. The faster players familiarise themselves to each other's actions, the more iterations of the game there are in any set length of time. Thus, when players in prisoner's dilemma can adjust quickly to cooperative or non-cooperative actions by the other side, there are greater opportunities for cooperation for the same reasons that future play improves potential for cooperation in a prisoner's dilemma game. But past time plays a rather small role as past experience can either encourage or hinder cooperation because of the mixed effects of learning and building trust between players. This is directly related to the associated rewards from cooperation because of reputational effects of cooperation when games are repeated into the future. "Generally, past success at cooperation will positively reinforce cooperation because of increased reputational costs of renegeing on longstanding arrangements. However, past success at cooperation also enhances the stability of a regime so that players may begin to feel they can cheat on cooperation without disrupting the tendency of other states to cooperate" (Snidal 1985:931).

Since as Bicchieri indicates, following social norms transforms a prisoner's dilemma game to a coordination game, it broadens up the description of social norms; and if we apply this to personal rules we can say that following personal rules, like following social norms, can transform its description from being like an iterated prisoner's dilemma to likewise being like a coordination game, which is less limiting.

Coordination is when two or more players have matching goals but are indifferent about where they match. Two friends may want to go to the same restaurant (common goal) but are indifferent as to what time they meet up to go to the restaurant. If they preferred to meet at different times, they still want to go to the restaurant together (common goal) but conflict on the time of meeting (conflicting interests).

This game poses a different problem of collective action than does prisoner's dilemma. The problem in prisoner's dilemma is that in pursuing its own self-interest, each player imposes costs on the other independent of other player's choices, whereas in the coordination game each imposes costs or benefits on the other contingent upon the other's choice. The collective action problem is that neither

player can choose its best policy without knowing what the other intends to do but there is no obvious point at which to coordinate. However, once the coordination solution has been achieved, it does not need to be enforced as did the cooperative outcome in simple prisoner's dilemma. It is self-enforcing because neither player has any incentive to depart from the coordination point in the single play coordination game. Thus, we can see that the problem of coordination is different from that of assistance in prisoner's dilemma.

In a coordination game, no centralised enforcement is necessary, because neither player has incentive to depart from cooperation. In a coordination game, the best outcome for all players is that of cooperation amongst all players whilst in a prisoner's dilemma game the best outcome is one where a player defects and the opponents all cooperate – this is unlikely that this would occur but is nonetheless the most favourable outcome that is desired by all players. In a coordination game, you want to cooperate, you don't have to force or manipulate the situation; you don't have to convince players that cooperation is best for them in the long run; there is already a desire to cooperate as cooperation, itself, is the incentive. This is because the expectations of how the other player will behave are conveyed by the convention which provides a persuasive reason for each player to stick to it in order to reap the rewards from coordination. Because the need for enforcement that exists in prisoner's dilemma is absent, in coordination, players will be more unwilling to surrender autonomy to a central agency because an alternative decentralised resolution is available. And also unlike prisoner's dilemma where an obvious cooperation point exists, a sovereign would have no clear criterion upon which to base a choice of any substitute coordination points. Therefore, the simple coordination problem is almost certain to result in a decentralised solution (Snidal 1985:932).

Despite the importance of coordination in determining a player's welfare, some incentive to depart from any coordinated outcome may persist as some opposition of interests remains within the overall desire to coordinate.

A first difference from prisoner's dilemma arises with respect to asymmetries amongst players. Whereas the n -state extension of prisoner's dilemma could in principle be fully symmetric, the extension of coordination is necessarily asymmetric.

Consider the coordination axis ABC of *Figure 5* below, when you add a third player whose preferred

outcome lies between A and B, say C, and whose payoff is shown at the third element in the payoff set. The coordination axis now looks like the in *Figure 6*. The new player would be advantaged relative to the other players since it will necessarily receive an outcome with an ordinal ranking of at least 3.5. Players that happen to have most preferred outcomes closer to the middle of the coordination axis are in an inherently better position than players with more extreme preferences. Thus, coordination problems are almost certain to put players in non-symmetric relations with one another.

Coordination Axis in the Coordination Game

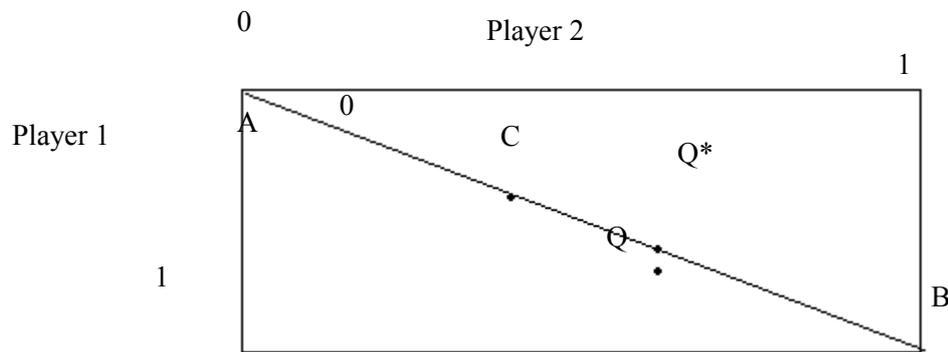


Figure 5

(Snidal 1985:933).

Asymmetry of three-player coordination

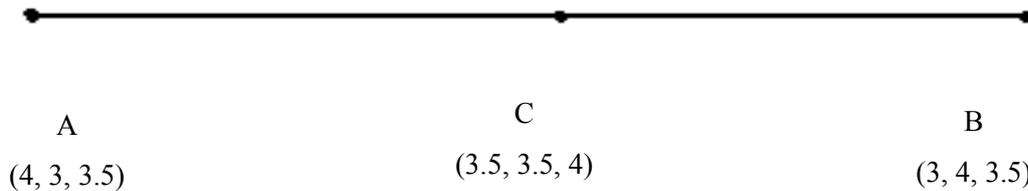


Figure 6

(Snidal 1985:935).

A second source of asymmetry arises when some players have a greater effect on the outcome than others. In prisoner's dilemma this typically arises because some players impose greater costs on others through their choices. In coordination, the issue is not one of imposing externalities but rather one of the relative need to coordinate. In general, the need for coordination between any two players will differ with their levels of interdependence upon one another.

Unlike prisoner's dilemma where asymmetries sometime favour smaller and less influential players, in coordination, asymmetries favour larger and more influential players.

The effect of increasing the number of players involved in the coordination game is also different from that of a prisoner's dilemma game. Again some of the socio-political features of large versus small groups which make organisation difficult in prisoner's dilemma have similar effects in coordination. To the extent that large groups hinder communication and make bargaining difficult, this will make agreement on a coordinating convention more complicated unless a clear answer emerges. However, the penalty of reduced visibility of players' individual actions in larger groups will not be as serious in coordination as in prisoner's dilemma. Although it will give individual players an opportunity to slightly waver from the convention, "the nature of the coordination problem is such that this will not be a problem in the large since national incentives are to coordinate voluntarily with other players. Thus, a larger number of players will give rise to communications and other problems of organisation in coordination but not to the strategic incentives to act

uncooperatively which are pervasive in frustrating cooperation in n -state prisoner's dilemma" (Snidal 1985:935-936).

An increased number of players will reduce the likelihood of the breakdown of cooperation resulting from the conscious actions of players. Once a point of coordination has been identified, there may be incentive for each player to depart from the coordination point or none at all. However, as the number of players involved in a coordination problem increases, the effect of any single player and, therefore, the probability that it could blackmail the others in this way significantly decrease. Thus, in coordination, larger numbers of players do not hinder cooperation as much as in prisoner's dilemma and help cooperation in some cases (Snidal 1985).

Exclusion does not play as important a role in coordination games as it did in prisoner's dilemma games as it is not a relevant option in coordination. In prisoner's dilemma, costs and benefits are imposed independently of the others' actions so that exclusion can affect one player without affecting another. In coordination, costs and benefits are imposed contingent upon the others' actions so that the other cannot be excluded without in some sense excluding all. Thus, the very essence of the coordination problem is that exclusion is neither feasible nor desirable. Second, whereas in prisoner's dilemma asymmetry amongst players facilitates cooperation by lessening communication and bargaining problems among the most relevant set of players, in coordination, it decreases cooperation by increasing the strategic incentive to bargain over the coordination point. The exception is when a single player is sufficiently dominant that it can unilaterally determine the coordinated outcome.

The past, present and future have different effects on coordination in comparison to those it exhibits upon prisoner's dilemma. Because cooperation in a coordination game depends on the ability to agree on common conventions or norms, past experience with and learning of norms and conventions will be stabilizing. The incentive for players to slightly cheat on the coordinating convention in the short-term may be enhanced by this greater stability. However, players would have to weigh smaller gains against the effect cheating might have in diminishing the clarity of well-established norms and hence of disrupting the greater benefits that come from coordination in the long run. The role of future time will be the exact opposite of that in prisoner's dilemma as, here, the prospect of repeated play provides players with the incentive to cooperate which they do not have in one-shot games. In coordination, the one-shot outcome is likely already to be cooperative because, here, what is more important is the ability to coordinate somewhere, rather than precisely where to coordinate. But a

longer duration of the game would likely give players more incentive to be concerned with the precise distributional results of specific coordination outcomes. In the extreme, it may induce them deliberately to disrupt established coordinated outcomes in an attempt to move towards other more favourable conventions. “The prospects for such strategic interaction rest on the (discounted) relative value of future versus present outcomes and the perceived prospects of implementing a change. Thus, playing through time may be destabilizing in coordination problems, but these considerations will still typically be dominated by the overall stability of the coordination situation” (Snidal 1985:936). The effect of present time follows directly from a consideration of the incentives to disrupt an established coordination outcome for strategic reasons. “If adjustment of choices is a lengthy process, then attempts to initiate change in coordinating conventions will necessarily entail greater costs from a longer period of non-coordination during the adjustment process. In general, this should discourage players from trying to change the convention and, thereby, enhance the stability of the system (Snidal 1985).

Ainslie’s personal rules thus may encompass more activities and possible multiple player interactions than the explanation he offers via the prisoner’s dilemma model. We, thereby, see that from the more accommodative nature of the coordination game in comparison to that of the prisoner’s dilemma model, it perhaps would have done Ainslie good to use something like the coordination game when explaining how personal rules worked.

6.

CONCLUSION AND FINDINGS

Section 1 of this dissertation introduces Ainslie's account of self-defeating behaviour which he shows is a result of our hyperbolic tendency, as derived from the matching law. Ainslie, thus suggests the will as a possible tool to curb this tendency, comparing it to an iterated prisoner's dilemma game such that the successive interests of an individual interact with one another like players in an iterated prisoner's dilemma game. However, Ainslie's comparison of the will to an iterated prisoner's dilemma game essentially places the will in a box, restricting our understanding of it to the structure; yet there is a complexity and multidimensionality that the prisoner's dilemma structure does not show. I, thus compare Ainslie's personal rules to Bicchieri's social norms due to them both being tools for self-control and sharing several similarities. Because Bicchieri manages to explain her theory of social norms beyond the prisoner's dilemma game structure, I infer that if social norms can be explained beyond the limited structure of prisoner's dilemma, so too can personal rules, thereby, providing us with a broader explanation of the will.

Sections 2 and 3 look at Ainslie's theory in more detail, showing how hyperbolic discounting emerged from the matching law by the observation that we value rewards in inverse proportion to delay. I then look further at hyperbolic discounting as a problem and all the strategies Ainslie suggests as possible tools against self-defeating behaviour as well as what he considers to be the strongest tool we have at our disposal from these suggestions i.e. personal rules/the will. Section 3 looks at how personal rules compare to the prisoner's dilemma structure in greater detail showing that iterated prisoner's dilemma is limited to the independent nature of the strategies at play whereas the will demonstrates successive interests having a stake in each others' behaviour which is what would motivate pursuing an *LL* reward.

Section 4 introduces Bicchieri's theory on social norms and looks at how she also compares social norms to prisoner's dilemma. However, what is interesting is that she demonstrates how following social norms would convert a typical prisoner's dilemma game into one of coordination which would cover more options than would prisoner's dilemma.

Section 5 compares personal rules and social norms, looking at their comparison to iterated prisoner's

dilemma and extending personal rules beyond this structure like Bicchieri does with social norms so to broaden the understanding of the will. Iterated prisoner's dilemma like the will, according to Ainslie, solves the problem of limited warfare, making an *LL* reward (when choosing between a *LL* reward and a *SS* reward) preferable because it makes the current choice predictive of future choice. In the same way social norms transform mixed-motive games (similar to the idea of limited warfare) into coordination games. Thus, both the will and social norms encourage mutual cooperation, as this works out to be the most rewarding outcome, if all the players want to maximize their personal long run utility in an iterated prisoner's dilemma scenario where the shadow of the future is long (in that the game's end is unknown).

Comparing the will to an iterated prisoner's dilemma is avoidably narrow, since the successfully restrained individual (who uses her will effectively) is to some extent getting beyond „limited warfare’ (where parties despite having conflicting goals have a common goal where there is a motivation to satisfy each of the goals – dominant at different points in time) into something more like a coordination as following a personal rule would be like following a social norm, whereby, in so doing we transform a prisoner's dilemma scenario between our *SS* preference and conflicting *LL* preference into a coordination scenario directing our motivation towards the *LL* preference.

I suggest that Ainslie's description of the will as compared to an iterated prisoner's dilemma could be extended by looking for an account of coordination problems which gives an appropriate place to issues of temptation and restraint. We now see that treating the will like social norms, both being tools for self-control, can provide a more general and flexible framework for thinking about the gains from self-control, and the strategic situation of the tempted individual.

7.

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