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Guilt, love, and the behavioral enrichment of Public Choice Theory

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Abstract
The prisoner's dilemma captures the incentive problem present in many contexts of interest to public choice theorists. Self-interest makes defection a dominant strategy, and public choice theorists can identify useful government institutions and rules as government interventions that resolve the prisoner's dilemma and capture the benefits of cooperation. We can similarly identify useful social norms as interventions that resolve the prisoner's dilemma. This implies we can extend and enrich public choice theory by recognizing how the relatively "hidden" motivations present in social norms may substitute for or complement government interventions. We examine guilt and love as examples, and we illustrate how they facilitate, respectively, trade and voting. These examples more generally illustrate why public policy makers should consider unseen, or at least subtle, motivations.

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Introduction

Public choice theory applies economics to political science, normally maintaining the "behavioral postulate that man is an egoistic, rational, utility maximizer" (Mueller, 1976, p. 395). While most decisions people make are individual, public choice primarily applies to collective decisions (Shaw, 2018). Yet, methodologically, the individual is the typical unit of analysis, not a collective like a community or state. The tasks of public choice theory are to understand how different rules and individual incentives affect the collective decision and conversely how collective decisions affect individuals (Shughart, 2018).

In his Nobel Prize acceptance lecture, James Buchanan (1986) emphasizes that public choice considers politics as exchange. Individuals rationally trade their individual freedoms for government rules when doing so furthers one or more individual interests. There is one significant complication in politics, however, compared to trade in private markets. Because government provides rules and goods collectively, individuals cannot adjust their level of participation, nor can they opt out without significant and often prohibitive cost. Therefore injustice is possible, occurring when government coerces people into coalitions they would not voluntarily join. This suggests a normative a rule for evaluating the provision of a public good: providing a collectively is better when a higher percentage of people would voluntarily consent to this collective provision, with unanimous consent being the ideal.

One critique of public choice theory is an over-reliance on the "maximization of self-interest" assumption. Bluntly, Munger (2011, p. 298) says, "Homo economicus is a sociopath." No market nor society could survive, he says, if decision makers evaluated the utility of cheating on each agreement. The moral code shared by society's members that one should keep promises, obey rules, and not cheat supports everyday trading and enforces informal contract agreements. Mitchell (1999) contrasts the political science approach with the public choice approach, noting that the former primarily applies the behavioral principles of social psychology, whereas the latter relies on the self-interest assumption. Kliemt (2005) presents evidence that the over-reliance on pure material self-interest implies that public choice theory recommends mistaken policies.

Voigt (1997, p. 21) emphasizes the existence of a constitutional system of rules that not only includes laws enforced by government but also includes "norms, values, and attitudes." Formal laws and informal norms establish "conventions," and these conventions enforce rules extrinsically and intrinsically. Competing individual interests cause conflict, Voigt notes, but values and norms tend to reduce conflict by unifying people and aligning their interests. Bowles (1998, p. 92) quoting Kenneth Arrow, notes, "Norms of social behavior, including ethical and moral codes, may be reactions of society to compensate for market failures." Public choice theory has focused on explaining laws enforced by government and their impacts,

but a more complete public choice theory would also explain the development of norms, values, and attitudes and their impacts.

In reviewing public choice theory, Mueller (1976, p. 397) claims we can depict the incentive problems associated with the provision of "nearly all public goods" using the prisoner's dilemma. Self-interested individuals will defect, mostly in the form of free riding, so the benefits of mutual cooperation are forgone as public goods are undersupplied. Public choice theory has traditionally focused on how government intervention can address this problem by creating and enforcing a rule that incentivizes cooperation. Our purpose here is to demonstrate that we can extend public choice theory by recognizing that social norms can transform the prisoner's dilemma, so the dilemma can be resolved with less government intervention, or even no intervention.

We apply the modeling approach used by Pingle (2017), which captures the impact of a motive other than material self-interest as a transformation of the payoffs of a non-cooperative game. We consider two such motives: (1) guilt aversion and (2) love. Each of these more subtle, even hidden, motivators can enhance the government's ability to resolve the prisoner's dilemma. Guilt does so by increasing the cost paid for defecting. Love does so by increasing the benefit received for cooperating.

Public goods and the prisoner's dilemma

Mueller (1976) identifies two factors that will tend to create a prisoner's dilemma as people seek to produce goods: (1) cooperation, which enhances the ability to provide the good, and (2) non-excludability: it is not possible (or not practical) to exclude those who do not cooperate in providing the good from consuming it. The first factor makes cooperation more efficient than non-cooperation. The second factor makes cooperation risky, for cooperating can yield a net loss when others free ride instead of cooperating in kind.

Figure 1 presents a general two-person game payoff matrix and a prisoner's dilemma example examined by Peysakhovich and Rand (2016).[1] Consider the row player. Let the probability p denote the row player's belief regarding the probability that the column player will choose the cooperation strategy C, while $1-p$ is the belief regarding the probability that the non-cooperative defect strategy D will be chosen by the column player. Let $V(X)$ denote the expected utility of strategy $X \in (C,D)$, and $U(a)$ be the utility of the outcome $a \in (a_{CC}, a_{DC}, a_{DC}, a_{DD})$, where $U'(a) > 0$ and $U''(a) < 0$. The expected utilities of cooperation and defection for the row player can then be expressed as $V(C) = pU(a_{CC} + [1-p]U(a_{CD})$ and $U(D) = pU(a_{DC}) + [1-p]U(a_{DD})$, so the quantity $V(C) - V(D) = p[U(a_{CC}) - U(a_{DC})] + [1-p][U(a_{CD} - U(a_{DD})]$ is the net utility obtained by cooperating rather than defecting. Since $a_{DC} > a_{CC}$ and $a_{DD} > a_{CD}$ for any prisoner's dilemma, we find $V(D) > V(C)$ for any value of p. That is, the defect strategy strongly dominates the cooperate strategy, no matter what belief the row player holds about the willingness of the column player to cooperate. A symmetric result holds for the column player.

	C	D
C	(a_{CC}, b_{CC}) (4,4)	(a_{CD}, b_{CD}) (0,5)
D	(a_{DC}, b_{DC}) (5,0)	(a_{DD}, b_{DD}) (1,1)

Figure 1. A Standard Prisoner's Dilemma

In a prisoner's dilemma, there are two impediments to cooperation: risk and opportunism. At one extreme, with the belief $p = 0$ (no expected cooperation), the net expected utility of cooperating is $U(C) - U(D) = U(a_{CD} - U(a_{DD}) < 0$. The quantity $a_{DD} - a_{CD}$ (in our numerical example above, $1 - 0 = 1$) is the payoff placed at risk when choosing to cooperate. At the other extreme, with the belief $p = 1$ (full cooperation expected), the net expected utility of defecting is $U(D) - U(C) = U(a_{DC} - U(a_{CC}) > 0$. The quantity $a_{DC} - a_{CC}$ (in our numerical example, $5 - 4 = 1$?' is a measure of the gain that can be obtained from opportunistically defecting.[2]

Guilt aversion and public good provision

As noted by Mueller (1976), the common approach in public choice theory is to examine how government can resolve the prisoner's dilemma and supply a public good more effectively than "the market" (i.e., the two players are left free) by introducing a coercive power. We want to consider a government solution, but we also want to consider the potential impact of a social norm that produces guilt aversion, a more subtle coercive power. Charness and Dufwenberg (2006, p. 1580) describe guilt as the decrease in utility people experience when "they believe they let others down," and they contend a person "suffers from guilt to the extent he believes he hurts others relative to what they believe they will get" (Charness and Dufwenberg, 2006, p. 1583). In a prisoner's dilemma, it

[1] For each party in a prisoner's dilemma, the "temptation" payoff exceeds the mutual cooperation payoff, or $a_{DC} > a_{CC}$, and the "sucker" payoff is less then the mutual defection payoff, or $a_{DD} > a_{CD}$. As noted by Embrey, Frechette, and Yuksel (2018), the restriction $a_{CC} > \frac{a_{CD}+a_{DC}}{2} > a_{DD}$ is sufficient to ensure that mutual cooperation is more efficient than mutual defection and more efficient than the asymmetric outcome where one defects and one cooperates.

[2] Ahn et al (2001, p.139) recognize these two impediments to cooperation in the prisoner's dilemma. They refer to the risk of losing the payoff difference $a_{DD} - a_{CD}$ as "fear", and to the desire to acquire the potential net gain $a_{DC} - a_{CC}$ as "greed." They normalize these, as do Embry, Frechette, and Yuksel (2018, p. 516), so that the results from various experiments can be reasonably compared. In general, the empirical findings are that fear and greed each motivate players, with normalized greed especially motivating non-cooperative behavior.

is reasonable to think that someone choosing to cooperate is expecting the other to cooperate. Therefore, defecting would hurt the cooperator relative to what the cooperator believes he or she would get, so this defection might elicit some guilt in the mind of the defector.

Figure 2 presents a game where government intervenes and seeks to establish justice by punishing defection, but an ethic that produces guilt may also punish defection. By imposing a tax t on each player, government obtains the resources that allow it to place a cost on defection. The degree e to which members of the society possess an ethic that produces guilt may also influence the cost carried by defection. The total cost borne by defectors is then $c(t,e)$. We choose a numerical example where the tax $t = 1$ generates the cost $c(t,e) = 2$. Overlaying this government action and ethic onto the prisoner's dilemma presented in Figure 1, we see in Figure 2 that the tax combined with the ethic has fruitfully transformed the dilemma: cooperation becomes a strictly dominant strategy.

	C	D
C	$(a_{CC}-t, b_{CC}-t)$ (3,3)	$(a_{CD}-t, b_{CD}-c(t,e)-t)$ (−1,2)
D	$(a_{DC}-c(t,e)-t, b_{DC}-t)$ (2, − 1)	$(a_{DD}-c(t,e)-t, b_{DD}-c(t,e)-t$ (−2, − 2)

Figure 2. A Government Solution to a Public Good Problem

To resolve the dilemma, the total cost of defection must eliminate the incentive to defect opportunistically and also eliminate the risk associated with cooperation. To eliminate the former, $a_{CC}-t \geq a_{DC}-c(t,e)-t$, or $c(t,e) \geq a_{DC}-a_{CC}$, must hold. To eliminate the latter, $a_{CD}-t \geq a_{DD}-c(t,e)-t$, or $c(t,e) \geq a_{CD}-a_{DD}$, must hold. Thus, to eliminate both, $c(t,e) \geq max(a_{DC}-a_{CC}, a_{CD}-a_{DD}) \equiv M$ must hold.

This begs the question, "What determines the form of the cost function $c(t,e)$?" A higher tax should allow government to impose a higher cost on defection, though it is reasonable to expect diminishing returns. Similarly, a stronger ethic should also imply a higher cost on defection, but again with diminishing returns. Because taxation and ethics could complement each other or be substitutes, we consider the general cost function $c(t,e) = at^{\alpha} + be^{\beta} + ht^{\gamma}e^{\delta}$, where the coefficient parameters are non-negative and the exponent parameters are between zero and one.

First, consider government intervention when the ethic does not influence the cost, for this is the traditional public choice theory approach. Setting $b = 0$ and $h = 0$, the cost function becomes $c(t,e) = at^{\alpha}$. To transform the dilemma such that cooperation becomes the dominant strategy, we must have $c(t,e) = M$, or $at^{\alpha} = M$, or $t = [\frac{M}{a}]^{\frac{1}{\alpha}}$. The tax is worth implementing as long as the per-head tax is less than the per-head net gain obtained from what it finances, i.e., societal cooperation being the equilibrium rather than societal defection, or as long as $t \geq a_{CC}-a_{DD}$. Thus, we learn that government involvement is worthwhile to the row player as long as $[\frac{M}{a}]^{\frac{1}{\alpha}} \geq a_{CC}-a_{DD}$. That is, with no ethic imposing a cost on defection, we learn that government can resolve the dilemma with a tax if the impediment to cooperation M is small enough, if the cost sensitivity a to the tax is large enough, or if the gain from cooperation $a_{CC}-a_{DD}$ is large enough. The tax must be higher when the impediment to cooperation M is higher or when the sensitivity a of the cost to the tax is lower.

An ethic that produces guilt can help provide a public good by complementing the government tax. We illustrate this in Figure 3 by plotting two cases, one with a stronger ethic e and one with a weaker ethic e_1. We set $a = 0$, $b = 0$, and $h > 0$, so the cost function is $c(t,e) = ht^{\gamma}e^{\delta}$. Comparing these two cases, a higher ethics level $(e_2 > e_1)$ implies a higher cost on defection for a given tax level t. As shown, this implies that the minimum cost $c(t_2,e_2) = M$ required to resolve the dilemma can be provided with a lower tax level, $t_2 < t_1$. For the examples we show, the ethic e_1 is weak enough that the tax level t_1 necessary to overcome the impediment to cooperating M is greater than the gain $a_{CC}-a_{DD}$ obtainable from cooperation, so it is not worthwhile for government to intervene. However, with the stronger ethic e_2, it is worthwhile for government to intervene by setting tax level t_1 because the minimum required cost M can be reached at this tax level with cooperation still providing a net gain.

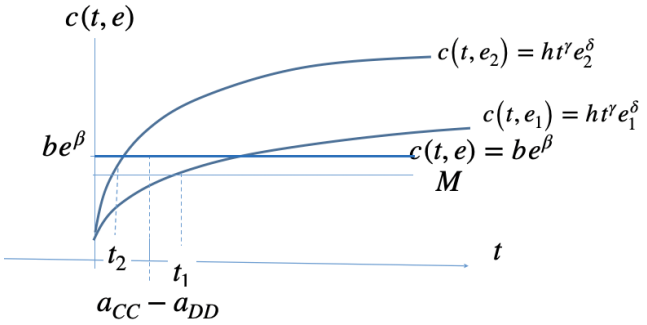

Figure 3. Ethics and Public Good Provision

We show a third case in Figure 3 to illustrate that an ethic that produces guilt can substitute for government intervention. In this case, government either cannot impose a cost ($a = 0$ and $h = 0$) or chooses not to ($t = 0$), so $c(t,e) = be^{\beta}$. Yet, as shown, if the ethic is high enough (e large) or the cost is sensitive enough to the ethic (b large), then $be^{\beta} > M$ can hold, meaning an ethic alone can resolve the prisoner's dilemma. Conversely, if the ethic is not strong enough (e small) or the cost is not very sensitive to the ethic (b small), then $be^{\beta} < M$, and the ethic alone cannot resolve the dilemma and induce cooperation. In this latter case, to resolve the dilemma, government intervention is necessary, though it may not be sufficient.

Love and public goods

Love for another can also overcome impediments to cooperation. To examine this possibility, let $\hat{V}(C) = \hat{p}U(b_{CC} + [1 - \hat{p}]U(b_{CD})$ be the expected utility of the column player when the row player cooperates, and let $\hat{V}(D) = \hat{p}U(b\text{–}DC) + [1 - \hat{p}]U(b_{DD})$ be the expected utility of the column player when the row player defects. In addition to receiving utility from own outcomes, assume the row player also obtains "egoistic" warm-glow utility[3] described by Andreoni (1989) from the net expected utility $\hat{V}(C) - \hat{V}(D)$ of the column player, which is positive for all values of $\hat{p}$ (the column player's belief regarding the probability that the row player will cooperate). We can then present the row player's expected utility from cooperation as $V(C) = pU(a_{CC} + [1 - p]U(a_{CD} + \alpha[[\hat{p}U(b_{CC}) + [1 - \hat{p}U(b_{CD})] - [\hat{p}U(b_{DC}) + [1 - \hat{p}]U(b_{DD})]]$.

The parameter α is the weight the row player places on the net expected utility of the column player, a measure of the love the row player has for the column player.[4]

For simplicity and as is most typical, assume the two players are identical, so the believed probability that the other will cooperate is the same for both players (i.e., $\hat{p} = p$) and the payoffs of being in a given position are also the same (i.e., $b_{CC} = a_{CC}$, $b_{DD} = a_{DD}$, $b_{CD} = a_{DC}$, $b_{DC} = a_{CD}$).[5] The expected utility difference between the two strategies for the row player then becomes

$$V(C) - V(D) = p[U(a_{CC}) - U(a_{DC})] + [1 - p][U(a_{CD}) - U(a_{DD})] + \alpha[p[U(a_{CC}) - U(a_{CD})] + [1 - p][U(a_{DC}) - U(a_{DD})] \quad (1)$$

This difference is strictly increasing in the love level α the row player has for the column player, which allows us to identify the level of love that just compensates for the impediments to cooperation, equating the expected utility of cooperation with that of defection:

$$\alpha = \frac{p[U(a_{DC}) - U(a_{CC})] + [1 - p][U(a_{DD}) - U(a_{CD})]}{p[U(a_{CC}) - U(a_{CD})] + [1 - p][U(a_{DC}) - U(a_{DD})]} \quad (2)$$

Condition (2) helps us understand when love can more readily overcome the impediments to cooperation. The opportunism impediment $a_{DC} - a_{CC}$ and the risk impediment $a_{DD} - a_{CD}$ are each in the numerator, intuitively indicating that more love is needed when either impediment is larger. The right side of (2) is decreasing in a_{CC} and increasing in a_{DD}. Thus, an increase in the gain from cooperation $a_{CC} - a_{CD}$ that occurs because of either an increase in a_{CC} or a decrease in a_{DD} decreases the amount of love necessary to overcome the impediments to cooperation. An increase in the gain from opportunism $a_{DC} - a_{CC}$ caused by a decrease in a_{CC}, or an increase in the risk of cooperation $a_{DD} - a_{CD}$ caused by an increase in a_{DD}, increases the love that is necessary.

The right side of (2) is decreasing in p, which indicates that less love is necessary when it is believed others are more likely to cooperate. When $p = 1$, there is no risk associated with cooperating, so only the loss associated with opportunism must be overcome in order to bring about cooperation, and this can be overcome with a love level of $\alpha = [U(a_{DC}) - U(a_{CC})]/[U(a_{CC}) - U(a_{CD})]$. When $p = 0$, meaning defection is certain, it is the loss of personal utility from defection that must be overcome, which is accomplished with the love level $\alpha = [U(a_{DD}) - U(a_{CD})]/[U(a_{DC}) - U(a_{DD})]$.

Implications for policy

Trade and voting are contexts in which prisoner's dilemma-type impediments to cooperation can arise, but relatively hidden, non-material costs (e.g., guilt) or non-material benefits (e.g., a warm glow) can help overcome these impediments.

An agreement to trade lifts each party because voluntary trade is mutually beneficial. Yet, in many instances, each trader has the opportunity to defect on a trade agreement in some way (e.g., to cheat, or shirk). If defection provides individual gain at the expense of the other, then a prisoner's dilemma situation may arise and pure material self-interest will discourage the trade.

McCloskey (2006, p.505) notes that "Commerce… instructs in courtesy; softens barbaric instincts and demands attention to manners; [and] teaches fidelity in contracts, honesty in fair dealings, and concern for one's moral reputation." How does commerce instruct?

The work of Ariely (2010) provides one answer. Summarizing the results of many experiments examining dishonesty, Ariely (2012, p. 239) concludes, "Very few people steal to a maximal degree. But, many good people cheat just a little." Ariely (2012, p. 237) attributes cheating to the "rational economic motivation" of gaining a possible benefit, but he attributes not cheating as much as possible to a seemingly irrational motivation: The "psychological motivation" of wanting "to be able to view ourselves as wonderful human beings." That is, our culture contains an ethic that imposes a psychic cost (e.g., guilt) when we defect by cheating or being dishonest. This invisible psychic cost is sufficient to enable market transactions when it is sufficient to resolve a prisoner's dilemma that may exist.

[3] Andreoni (1989) distinguishes impure altruism from pure altruism. Impure altruism provides you with a "warm glow", which is formally additional utility you receive that you derive from the size of your personal gift to another or to a public good. Pure altruism does not provide this direct warm-glow utility. Andreoni describes impure altruism as egoistic because it is motivated by pure self-interest, the utility obtained directly from the giving. You may gain from pure altruism, but there is no direct gain from your act of giving itself. Rather, if you gain under pure altruism, for example because there is a greater amount of a public good, it is because of the results of the giving by all people. In our model here, the altruism is of the warm-glow egoistic type.

[4] We thank an anonymous referee for pointing out that the version of love we recognize here is just one specific form of an "other regarding preference." This version of caring for another is not inequality aversion, for example. Here, love is receiving utility, a warm glow, from seeing the other receive higher expected utility.

[5] We also assume that neither player's utility function anticipates the love for them that is held by the other.

Ahn et al (2007, p. 354) identify reduced social distance, pre-play communication, repeated play, and the option to exit as promoting cooperation in the prisoner's dilemma. Real world trading environments typically include all these factors. Shorter social distance and pre-play communication make the psychic cost of defecting higher. If the psychic cost of guilt is not enough to discourage defection, repeated play and the option to exit provide opportunities to punish defectors tangibly.[6] Indeed, experience gained from repeated market transactions may play a role in training people to "cheat a little but not a lot." Cheating a little provides some material gains at the expense of the other, but cooperating in a mutually beneficial trade relationship would still be a dominant strategy if the cheating does not push the relationship into a prisoner's dilemma or invoke a tangible, material punishment.

Previous research (e.g., Ahn et al (2001) and Embrey, Frechette, and Yuksel (2018)) indicates an ethic alone is less likely to be sufficient when the gain from opportunistically defecting is larger, when the other is a stranger, or when the interaction is not repeated much. In the typical public good experiment (e.g., Andreoni, 1988), the opportunity to defect (e.g., free-ride, cheat, shirk) tends to extinguish cooperation when strangers repeatedly interact. Consequently, to provide a public good to a large and diverse population over an extensive and diverse region, government intervention will almost surely be necessary. Our model indicates less government intervention will be necessary when the ethic can complement the government intervention, or substitute for it.

Goette, Huffman, and Meier (2006) experimentally demonstrate that individuals can readily develop group social identities that will enhance cooperation within the group, compared to cooperation outside the group. Lapointe (2018, p. 242) finds that a common linguistic identity creates an in-group favoritism that facilitates public good provision. The group identity increases the psychic cost (i.e., guilt) of defecting upon someone within the group.

However, in-group favoritism can damage trust and cooperation more generally. Lapointe (2018) finds out-group aversion accompanies in-group favoritism. Meier et al (2016) perform a field experiment in Sicily and show "students in a neighborhood with high Mafia involvement exhibit lower generalized trust and trustworthiness, but higher in-group favoritism, with punishment norms failing to resolve these deficits." That is, there is evidence that people feel less guilt when they defect on those outside their "in-group."

Yates and Heckelman (2001) review models of rent-seeking where government provides a license to trade, and present a model of their own where the license is a prize offered to multiple potential winners. Our work indicates that the value government can extract for such a license decreases when an ethic that produces guilt can substitute for a tax that discourages defection. However, somewhat counterintuitively, when the ethic is only a complement, a stronger ethic increases the rent that can be captured because it allows the prisoner's dilemma to be resolved with a lower tax, leaving a larger trade surplus to be auctioned off for the license.

Voting is a topic examined by public choice theorists that love might help explain. Voting is difficult to explain with a pure self-interest motive because the expected personal gain from casting a single vote must normally be very small, so only a small cost of voting will be enough to make voting self-detrimental (Fedderson, 2004). William F. Shughart II (2018) refers to relatively high voter turnout as an unsolved public choice theory puzzle.

Our model offers a solution to this puzzle. We can reasonably represent democratic governance as a prisoner's dilemma, where voting is the cooperative strategy and not voting is the defection strategy. Mutual cooperation (all voting, in the simplest model) leads to better governance than mutual defection (all not voting, in the simplest model). The extrinsic material incentives are such that there is an opportunistic gain you can obtain from free-riding and letting other voters pay the costs (e.g., time spent going to vote, time spent becoming informed) of providing democratic governance. Thus, pure material self-interest predicts low voter turnout (i.e., zero turnout, in the simplest model). Yet, we can explain reasonable voter turnout by recognizing that many people may obtain an egoistic warm-glow utility from voting (e.g., from love of country, or from the feeling that you are helping others). Fedderson (2004, p. 107) identifies a "sociotropic voter" as one "motivated by altruistic or ethical concerns for the welfare of others rather than narrowly defined self-interest," and he finds "considerable evidence that voters are motivated to vote by a sense of civic duty." If the net material costs of voting are small, then only a small warm-glow utility from voting is necessary to make voting rational.

Feddersen (2004, p. 100) finds evidence that group affiliation enhances the sense of voting obligation. The research on love by Frijters and Foster (2013), which suggests a tight link between love and loyalty, helps explain this finding. Frijters and Foster usefully relate love and loyalty in a variety of relationships: soldier-country, parent-child, child-parent, fan-hero, faithful-God, and lover-lover. Part of their theory is that, as a relationship develops, with an individual or a group, the other becomes a part of the self. Expectations develop in relationships and within groups regarding the degree to which an individual should exhibit loyalty and sacrifice self for the other or for the group. This theory, which is implicit in our model, is an explanation for why the willingness to give in public goods games, reported by Andreoni, Rao, and Trachtman (2017, p. 626), increases when social distance is reduced, when subjects communicate, or when the recipient is identified specifically. Feddersen reports that those with a

[6] In repeated play, negative reciprocity can become a non-tangible motivator. A player exhibits negative reciprocity when the player reciprocates an act of "unkindness" with an act of "unkindness." In its typical form in a lab experiment, the player exhibiting negative reciprocity incurs a personal cost in order to punish another player who has exhibited an unkind act. Because we consider a simultaneous prisoner's dilemma game here, we do not examine negative reciprocity. See Fehr and Gachter (2000) for a good example of how negative reciprocity can promote cooperation.

stronger party affiliation are more likely to vote, and provides other examples. A reasonable explanation for this is that interactions with a political interest group produce a love for and loyalty to the group sufficient to overcome the impediments to cooperation that deter voting.

Conclusion

Hayek (1988, p.66), quoting Hume, contends that our morals and traditions are "not the conclusions of our reason," but rather have come to exist through an evolutionary process. Given that public choice theorists have recognized the incentive problem present in the prisoner's dilemma as a core problem in the provision of public goods, it is reasonable to suspect an evolutionary process would select ethics for their ability to help resolve the prisoner's dilemma. We have illustrated how guilt and love can transform the payoffs of the prisoner's dilemma in ways that can assist a government's effort to capture the benefits of cooperation. Further work of this type may help us further understand why particular ways of behaving have evolved to possess the label "ethical."

Peysakhovich and Rand (2016) demonstrate that cooperation learned in one environment can spill over into another. They present the "social heuristics hypothesis" as an explanation, which hypothesizes that social behaviors that are successful in the course of one's daily life (e.g., cooperation) become internalized as default heuristics. Voigt (1997, p. 29) contends that this kind of internalization process is what Hayek (1988) perceived regarding how cultural rules evolve. In emphasizing the common tendency for people across cultures to deviate from the predictions of pure material self-interest, Henrich et al (2001, p. 74) emphasize "individual level variables do not tend to explain differences;" cultural differences have the explanatory power. People may carry guilt, love, and other motivators from context to context, in addition to self-interest, as internalized norms selected because they help capture the benefits of cooperation.

The degree to which people are motivated by guilt, love, self-interest and other motives will evolve as people engage in market and non-market activities, participate in relationships with individuals and groups, and experience the outcomes of their choices. This evolution of culture will determine the extent to which culture itself can resolve the prisoner's dilemma problems that deter cooperation, the extent to which government involvement is necessary, and the degree to which the resolution is sensitive to both culture and government action. Policy makers should consider this evolving process as they design social interventions to enhance well-being. When culture can resolve the dilemma alone, the degree of injustice perceived according to Buchanan's (1986) measure would be minimal. In many cases, government intervention will still be necessary, but recognizing the degree to which culture may substitute for or complement the government effort should reduce the extent of unintended negative consequences, minimize the perceived injustice of the government coercion, and maximize the capture of the benefits of cooperation.

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