Abstract
Rational choice theory provides the most straightforward defense of political democracy. It asserts that political democracy gives people the same power in public life that markets give them in private life: the power to turn their preferences into social outcomes. However, rational choice models of voter behavior dramatically underpredict voter turnout in all but the smallest elections. Fiorina (1990) has called this fact “the paradox that ate rational choice theory,” and is the centerpiece of Green and Shapiro’s (1994) influential critique of rational choice methodology in political science. The standard rational choice defense of democracy is thus incoherent. This paper proposes a form of social rationality that strengthens the classical rational actor model. Social rationality explains the central statistical regularities concerning voter turnout and the historical regularities concerning collective action.

1 Introduction
Rational choice theory provides the most straightforward defense of political democracy. It asserts that political democracy gives people the same power in public life that markets give them in private life: the power to turn their preferences into social outcomes. However, rational choice models of voter behavior dramatically underpredict voter turnout in all but the smallest elections (Geys 2006). Fiorina (1990) has called this fact “the paradox that ate rational choice theory,” and is the centerpiece of Green and Shapiro’s (1994) influential critique of rational choice methodology in political science. The standard rational choice defense of democracy is thus incoherent. This paper proposes a concept of social rationality that strengthens the classical rational actor model. Social rationality explains the central statistical regularities concerning voter turnout and the historical regularities concerning large-scale collective action.
2 Public and Private Spheres

The private sphere is the locus of everyday transactions in the private lives of individuals embedded in civil society. An agent’s private persona is the set of preferences and beliefs that govern his behavior in the private sphere. The public sphere is the locus of activities that create, maintain, transform, interpret, and execute the rules of the game that define society itself. An individual’s public persona is the set of preferences, beliefs, and social networks that govern his behavior in the public sphere. Political theory is the study of public sphere behavior.

The private and public spheres are closely interrelated in individual decision-making. A public sphere transaction may have private sphere costs and benefits that a participant in the public sphere may take into account in deciding how to act. For instance, an individual may not vote if queues at the polling station are very long, or may decide to skip a collective action in which the probability of physical harm is very high.

By contrast with the private sphere, much behavior in the public sphere is fundamentally nonconsequential: an agent’s actions have no discernible effect on social outcomes. Consider, for instance, voting. Estimates of the probability that a single voter’s decision will determine the outcome of a large election are between one in ten million and one in one hundred million (Good and Mayer 1975, Chamberlain and Rothschild 1981, Gelman et al. 1998, Fischer 1999). In a compendium of close election results in Canada, Great Britain, Australia, and the United State, no election in which more that 40,000 votes were cast has ever been decided by a single vote. In the Massachusetts gubernatorial election of 1839, Marcus Morton won by two votes out of 102,066 votes cast. In the Winchester UK general election of 1997, Mike Oaten won by two votes out of 62,054 votes cast. The result was annulled and in a later by-election, Oaten won by 21,000 votes. In smaller elections, a victory by a very small margin is routinely followed by a recount where the margin is rarely less that twenty five (Wikipedia, List of Close Election Results, November 2014).

There is thus virtually no loss in accuracy in modeling voting behavior in large elections as purely nonconsequential in the sense that a single individual’s decision to vote or abstain, or for whom to vote, has no effect on the outcome of the election (Downs 1957a, Riker and Ordeshook 1968).

By a canonical participant in a decision process I mean an individual whose choice is nonconsequential: his behavior affects the outcomes infinitesimally or not at all. According to the data presented above, voters in a large election are canonical participants. Individuals who participate in a large collective actions are similarly canonical participants, as are those who volunteer to fight or otherwise contribute to one side in a war between nations. Of course, there are some public
sphere activities that are non-canonical, such as running for office, organizing a voter registration drive, or contributing considerable amounts of money to a particular party or candidate. But most activities in the public sphere are canonical. Ignoring the infinitesimal probabilities that canonical participants affect outcomes is useful and harmless simplification, akin to ignoring the force of gravity in analyzing the electronic circuitry of a computer or ignoring the light from distant stars in calculating the effectiveness of a solar panel.

Canonical public sphere activities are at the center of the structure and dynamics of modern societies. If citizens did not vote, or voted in an uninformed and random manner, liberal democratic societies could not function effectively. Moreover, modern liberal democracy was achieved through collective actions in taming despotic regimes over centuries. These collective actions have been successful because of the cumulative impact of canonical participants who incurred significant personal costs, often death, in opposing illegitimate authority (Bowles and Gintis 1986).

Canonical participants consider their behavior as rational goal-oriented behavior. If one asks someone in a queue at the polling booth why he is standing there, or if one asks someone in a group protesting political corruption why he is chanting and holding a sign, he will think the question absurd. He is there, of course, to register his support for various candidates for office, or to help topple a corrupt regime. If one points out to a canonical participant that his personal contribution will make no difference to the outcome, he will likely respond that you are guilty of faulty reasoning because if everyone followed your reasoning, no one would vote and no one would fight to topple a corrupt regime. If one persists in asking why he personally votes, noting that the other participants do not follow this reasoning, and his abstention will not affect the decision of others, he may well judge your thinking process bizarre and illogical, precisely because accepting the same sort of reasoning would lead virtually all citizens to abstain from voting.

The classical axioms of rational choice theory cannot explain the behavior of a canonical participant in the public sphere because these axioms cover only situations in which meaningful choices are consequential in the sense of leading to distinct entries in the agent’s preference function (Savage 1954). The behavior of canonical participants in the public sphere is not rational in this sense. We shall, however, argue that canonical participants are socially rational in an analytically clear sense.
3 Classical and Social Rationality

Before presenting a model of socially rational canonical public sphere behavior, I will present some rather simpler and straightforward principles of social rationality. Several economists, decision theorists, and philosophers have explored a more socially relevant form of rationality than those embodied in the classical axioms (Savage 1954). They term these forms variously “we-reasoning,” “team reasoning,” and “collective intentionality” (Bacharach 1987, 1992, 2006; Bacharach et al. 2006; Bratman 1993; Colman et al. 2008; Gilbert 1987, 1989; Hurley 2002; Searle 1995; Sugden 2003; Tuomela 1985). I will present several analytically clear examples of such choice behaviors that should appear in any plausible account of social rationality.

For instance, consider a two-player game illustrated in Figure 1. Assuming Bob is perfectly self-regarding, classical rationality suggests that he is indifferent between choosing Up or Down. Indeed, in animal behavior studies, even our closest relatives in the primate world often choose Up and Down with roughly equal frequency in such situations, whereas even small human children regularly choose the prosocial action (Silk et al. 2005, Vonk et al. 2008, Warneken and Tomasello 2006). We may call this elementary form of social rationality prosocial default. A socially rational agent exhibits prosocial default if, whenever he is classically indifferent to choices $A$ and $B$, but $A$ Pareto-dominates $B$ for the other players, then he does not choose $B$. In this case, choosing Down is a dominant strategy for Alice, and choosing Down is the only socially rational choice for Bob.

Consider the slightly more sophisticated game depicted in Figure 2. In this case Down is the socially rational choice for Bob, and Down, while no longer a dominant strategy, is the preferred choice for Alice provided she knows that Bob is socially rational. Bayesian rationality is also incapable justifying the choice of a Pareto-efficient Nash equilibrium in a pure coordination game with a unique Pareto-efficient equi-
librium. For instance, consider the game depicted in Figure 3. The Pareto-efficient \{Down,Down\} equilibrium cannot be justified by a classical rationality argument. For instance, if Bob believes Alice will play Up, his best response is Up. Bob may believe this because he believes Alice believes he will play Up. And so on. Similarly, Alice may be perfectly classically rational in playing Up. But this is not socially rational. If social rationality is mutually known, then the unique Nash equilibrium is the Pareto-efficient choice \{Down,Down\}.

More generally, we say a strategy profile $\sigma = \{\sigma_1, \ldots, \sigma_n\}$ in an $n$-player game strictly dominates a strategy profile $\tau = \{\tau_1, \ldots, \tau_n\}$ if the payoff to $\sigma$ is strictly greater than the payoff to $\tau$ for each player $i = 1, \ldots, n$. We say that a strategy profile $\tau$ is socially irrational if there is a Nash equilibrium that strictly dominates $\tau$. Otherwise we say $\tau$ is socially rational. Finally, let us say that a set of agents is socially rational if they never choose individual strategies that are part of socially irrational strategy profiles. We shall show that the classical notion of common knowledge of rationality can imply that agents are socially irrational. It follows that it may be inadvisable to assume common knowledge of rationality in analyzing games in which players are assumed to be socially rational.
3.1 Social Rationality in the Email Game

In the Email Game (Rubinstein 1989), Bob and Alice independently choose A or B. If the state of the world is $a$, the payoff to both players choosing A is $m > 0$, and their common payoff when both choose B is zero. If the state of the world is $b$, the payoff to both players choosing B is $m$, and their common payoff when both choose A is zero. In both states, if they fail to coordinate their choices, the player choosing B loses an amount $l > m$, while the player choosing A receives zero.

If both players know the state of the world, which is $b$ with probability $p$ and $a$ with probability $1 - p$, there is a Nash equilibrium in which both players coordinate to achieve the payoff $m$ in either state of the world. But suppose only Bob observes the state of the world, and if the state is $b$, his computer sends a message to this effect to Alice’s computer. If Alice’s computer receives this message, which occurs with probability $1 - \epsilon$, where $\epsilon > 0$ is some small error probability, then Alice’s computer sends an email to Bob’s computer confirming that she has received his message and now she knows that the state of the world is $b$. However, this message also has a probability $\epsilon$ of going astray. Assuming Bob’s computer receives this confirming message, it sends a second email to Alice’s computer confirming that it has received her confirmation. The two computers continue to send confirming messages back and forth, each time with a probability $\epsilon$ of going astray. Clearly, with probability one Bob’s computer will eventually fail to receive a confirming message, at which point the number of messages his computer sent is displayed on his computer screen, and similarly, the number of messages Alice’s computer sent is displayed on her computer screen.

It will be convenient to assume $\epsilon < \frac{1}{2}$ and $\epsilon < \frac{(1 - p)l}{m}$. Using the iterated elimination of dominated strategies, which is justified by CKR, Rubinstein (1989) shows that there is only one Nash equilibrium of this email game in which Bob plays A in the state of the world $a$. In this equilibrium both players play $A$ independently of the number of messages sent. Let $t_A$ and $t_B$ be the number of messages sent by Alice’s and Bob’s computers, respectively. However, if Bob and Alice are socially rational and they both know that each sent out at least one message ($t_B \geq 2, t_A \geq 1$), the state is surely $b$, each player knows that this is the case, and each player knows that other knows that this is the case. Therefore the strategy profile $\sigma$ in which Alice and Bob play A when at most message was received, whereas both play B if each received at least one message form a Nash equilibrium that strictly dominates the Nash equilibrium derived from the CKR assumption. To see this, suppose first that Bob plays his part in the strategy profile $\sigma$. Then if $t_A = 0$, Alice receives no signal, so she knows that with probability $(1 - p)/(1 - p + p\epsilon)$ the state is $a$ and Bob’s computer sent no signal, and with probability $p\epsilon/(1 - p + p\epsilon)$ the state is $b$ and Bob’s signal went astray. Her payoff
to A is thus zero and her payoff to B is \((- (1 - p) l + p \epsilon) m)/(1 - p + p \epsilon) < 0\), so Alice plays A. If \(t_A = 1\), then Alice knows the state is surely \(b\) and she knows that Bob knows this as well. Her computer automatically sends a message to this effect to Bob, which arrives with probability \(1 - \epsilon\). If this message arrives, then \(t_B \geq 2\), so Bob plays B. Otherwise Bob plays A. Thus Alice’s payoff to A is zero and her payoff to B is \((1 - \epsilon) m - \epsilon l > 0\), so Alice plays B if she has received one message, and hence if she has received more than one message.

Now suppose Alice plays her part in the strategy profile \(\sigma\). If \(t_B = 0\), then \(t_A = 0\) so Alice plays A, to which Bob’s choice of A is a best response. If \(t_B = 1\), then Bob’s computer sent a message to Alice. Conditional on the fact that Bob received no reply from Alice’s computer Alice received the message with probability \(p_B = \epsilon(1 - \epsilon)/(\epsilon + \epsilon(1 - \epsilon))\) and plays B, or Bob’s reply went astray, so Alice plays A with probability \(p_A = \epsilon/(\epsilon + \epsilon(1 - \epsilon))\). Because \(p_A > 1/2\) and \(l > m\), Bob’s best response is A. If \(t_B = 2\), then Bob knows Alice plays B, to which his best response is B. Similarly reasoning for \(t_B > 2\) and \(t_A > 0\) complete the proof.

The expected payoff to the Rubinstein equilibrium is \((1 - p)m\), while the payoff to strategy profile \(\sigma\) is \((1 - p)(1 - \epsilon) m\) for Bob and \((1 - p)(1 - \epsilon) m - p(1 - \epsilon)^2 \epsilon l\) for Alice. Because these payoffs are larger than those of the Rubinstein equilibrium, socially rational players will reject reasoning based on CKR in favor of the simple equilibrium: play B if and only if you know the state is \(b\). CKR in this situation implies socially irrational behavior on the part of the agents.

### 3.2 Social Rationality in a Global Game

Global games are games in which players receive correlated but noisy signals of payoff structure. We consider Carlsson and van Damme’s (1993) two-player global game in which Alice and Bob have two strategies, \(\alpha\) and \(\beta\). Either player can ensure a payoff of \(x\) by playing \(\alpha\), and each receives a payoff of 4 if they coordinate on \(\beta\). If they fail to coordinate, however, the \(\beta\)-player receives zero. If both players see \(x\), there is a Pareto-efficient equilibrium in which both players choose \(\alpha\) when \(x > 4\) and \(\beta\) when \(x \leq 4\).

The game is a global game, however, because Alice observes \(x\) with a small error \(\epsilon_A\), so that her observation \(x_A\) is uniformly distributed on the interval \([x - \epsilon, x + \epsilon]\). Bob similarly observes \(x_B\), which is uniformly distributed on \([x - \epsilon, x + \epsilon]\). We assume the game, including the maximum error \(\epsilon\) and the fact that the actual errors \(x_A - x\) and \(x_B - x\) are uncorrelated, are common knowledge.

There is a natural Nash equilibrium of this game in which each player \(i\) chooses \(\beta\) if \(x_i < 4\) and chooses \(\alpha\) if \(x_i \geq 4\). To see that this is a Nash equilibrium, suppose Bob chooses this strategy. Note that Alice’s posterior for \(x\) when she observes \(x_A\)
is uniformly distributed on \([x_A - \epsilon, x_A + \epsilon]\), which implies that \(x_A - 2\epsilon \leq x_B \leq x_A + 2\epsilon\). Clearly, then if Alice observes \(x_A \geq 4 + 2\epsilon\), then she knows that \(x_B \geq 4\), so Bob plays \(\alpha\), to which her best response is \(\alpha\). If she observes \(x_A < 4 - 2\epsilon\), then she knows that \(x_B < 4\) so Bob plays \(\beta\), to which her best response is \(\beta\).

Suppose she observes \(x_A\) such that \(4 \leq x_A \leq 4 + 2\epsilon\). Then \(x\) has mean \(> 4\), so the probability the Bob chooses \(\alpha\) is \(p_{\alpha} > 1/2\). Hence Alice’s best response is \(\alpha\). Finally, if \(4 - 2\epsilon < x_A < 4\), then a parallel argument shows that Bob chooses \(\alpha\) with probability \(p_{\alpha} < 1/2\), so Alice’s best response is to choose \(\beta\).

Note that the payoffs to the natural Nash equilibrium approach the full information payoffs as \(\epsilon \to 0\). However, if we assume CKR and thus reason using the iterated elimination of dominated strategies, Carlsson and van Damme (1993) show that there is a unique Nash equilibrium in which player \(i\) chooses \(\alpha\) after observing \(x_i \in (0, 2)\) and choosing \(\beta\) after observing \(x_i \in (2, 4)\). This equilibrium is clearly Pareto-dominated by the natural Nash equilibrium. Moreover, in many cases Alice may have a subjective prior that places a high probability on Bob’s playing his part in the natural Nash equilibrium, and Bob may believe that Alice will act similarly. In such a situation, rational Bob and rational Alice will play the natural Nash equilibrium whereas CKR implies they play a strictly dominated strategy profile. Hence CKR implies Alice and Bob are socially irrational.

4 The Social Rationality of Voter Turnout

The assertion that voting is a form of rational behavior is most clearly supported by the phenomenon of strategic voting (Cox 1994, Franklin et al. 1994). Strategic voting includes ignoring candidates that have no hope of winning, or voting for an unwanted candidate in order to avoid electing an even less preferred candidate (Niemi et al. 1992, Cox 1994). It also includes Duverger’s Law (Duverger 1972), which asserts that plurality rule elections tend to favor a two-party system, whereas a double ballot majority system and proportional representation tend to multipartyism. Voting also has a strong social element, including a rather ubiquitous social network effect: individuals who are more solidly embedded in strong social networks tend to vote at a higher rate (Edlin et al. 2007, Evren 2012).

To explore the nature of the social rationality of canonical participant behavior, I will follow Ledyard (1981) and Palfrey and Rosenthal (1985), who developed the currently most widely recognized model of rational pivotal voter behavior. Suppose an election is determined by majority rule, with a tie vote decided by a fair coin toss. There are \(m\) voters who choose simultaneously to vote for alternative 1, vote for alternative 2, or abstain. Alternative 1 is preferred by \(m_1 > 0\) voters and alternative 2 is preferred by \(m_2 = m - m_1 \geq 0\) voters. We assume \(m_1 \geq m_2\). If
\( b_i \) is the payoff to agent \( i \) if his alternative wins, with payoff zero if his side loses, and if \( d_i \) is the cost of voting as opposed to abstaining for agent \( i \), the \( i \) will vote rather than abstain if

\[
b_i \left( p_2^i + \frac{1}{2} p_1^i \right) \geq d_i. \tag{1}
\]

where \( p_1^i \) is the probability that \( i \)’s vote leads to a tie, and \( p_2^i \) is the probability that \( i \)’s vote breaks a tie. We write \( c_i = d_i / b_i \), and refer to \( c_i \) as the net cost of voting. It is clear that agent \( i \) will vote precisely when \( c_i \) exceeds a threshold \( c_i \) given by equation (1). Note that \( b_i \) need not be determined by pure self-interest, but may be affected by altruistic or spiteful attitudes towards others, as well as by purely ethical considerations concerning justice and equity. Similarly, \( d_i \) may include moral as well as self-interest motives, such as the citizen’s duty to vote, signaling one’s status as a good citizen, and garnering the good will of social network members.

Suppose \( q_j \) is the probability of voting for an agent preferring alternative \( j \), \( j = 1, 2 \). Suppose agent \( i \) supports alternative 1. The probability \( p_i(k_1, k_2) \) that \( k_j \) votes are cast for alternative \( j \), \( j = 1, 2 \), not including the vote of agent \( i \) (should he vote) is given by

\[
p_i(k_1, k_2) = \binom{m_1 - 1}{k_1} \binom{m_2}{k_2} q_1^{k_1} q_2^{k_2} (1 - q_1)^{m_1 - k_1 - 1} (1 - q_2)^{m_2 - k_2}. \tag{2}
\]

The probability that alternative 1 wins when agent \( i \) votes is then

\[
\sum_{i=1}^{m_1-1} \sum_{k_2=0}^{k_1-1} p_i(k_1, k_2) + \sum_{k_1=0}^{m_2} p_i(k_1, k_1) + \frac{1}{2} \sum_{k_1=0}^{m_2-1} p_i(k_1, k_1 + 1). \tag{3}
\]

The first (double) summation in (3) is the probability \( i \)’s alternative wins but \( i \) is not pivotal, the second summation is the probability that \( i \) breaks a tie, and the final summation is the probability \( i \) creates a tie and the coin flip favors alternative 1.

The probability that alternative 1 wins when this agent \( i \) abstains is similarly

\[
\sum_{i=1}^{m_1-1} \sum_{k_2=0}^{k_1-1} p_i(k_1, k_2) + \frac{1}{2} \sum_{k_1=0}^{m_2} p_i(k_1, k_1). \tag{4}
\]

Subtracting (4) from (3) we see that the largest net cost of voting \( c^*_i \) for which
agent $i$ will vote rather than abstain is given by

$$c_1^* = \frac{1}{2} \left( \sum_{k_1=0}^{m_2} p_i(k_1, k_1) + \sum_{k_1=0}^{m_2-1} p_i(k_1, k_1 + 1) \right). \quad (5)$$

Note that this cutoff is the same for all alternative 1 supporters. Repeating this argument for the case where agent $i$ prefers alternative 2, there is a maximum net cost of voting $c_2^*$ such that

$$c_2^* = \frac{1}{2} \left( \sum_{k_1=0}^{m_2} p_i(k_1, k_1) + \sum_{k_1=0}^{m_2} p_i(k_1 + 1, k_1) \right). \quad (6)$$

Suppose the net cost of voting has cumulative distribution $F_j(c)$ for agents who prefer alternative $j$, $j = 1, 2$. For ease of exposition, we assume the net cost of voting is uniformly distributed on the unit interval $[0, 1]$. This assumption affects the absolute size of turnout ratios, but not the comparative static results. Then we can replace $c_i$ with $q_i$ in equations (5) and (6), giving two equations in two unknowns for the Nash equilibrium values of voter turnout $(q_1, q_2)$.

This Nash equilibrium predicts the major empirical regularities of voter turnout, both in small-scale real-world elections and in the laboratory (Levine and Palfrey 2007). Rather than deriving the comparative statics of this voter turnout model analytically, which may or may not be possible, I have generated numerical solutions using the Mathematica software program (Wolfram Research, Inc. 2014).

![Figure 4](image.png)

**Figure 4:** The Size Effect: Voter turnout rates decline as electorate size increases.
The first regularity is the electoral size effect: voter turnout declines with increasing size of the electorate (Lijphart 1997). For instance, national elections have larger turnout rates than local elections. Figure 4 illustrates this phenomenon in our model with electorate sizes of 18 to 36, where the difference between the majority and minority voters is two. Similar results hold, however, for higher ratios of majority and minority voters. Note that these are clearly small election results because voter turnout declines rapidly towards zero for even moderately large electorate sizes.

The second and third electoral regularities are the voting cost effect and the importance of election effect: when the cost of voting increases, fewer people vote, and when the stakes are higher, more people vote. The reason given by our model is that an increase in the net cost of voting, ceteris paribus, entails a higher cutoff $c_j^*$, and a higher benefit to a voter from winning lowers the net cost of voting cutoff $c_j$. We can represent both of these effects, assuming they are experienced equally by all agents, by replacing $c_j$ by $\alpha c_j$ in equations (3) and (6), where $\alpha < 1$ corresponds to a decreased cost-benefit ratio. The results for an electorate of size 20 where the majority consists of between 11 and 20 voters is given Figure 5. Note that there is positive turnout even when alternative 2 has no supporters. This is because all agents want to avoid having the outcome determined by a coin flip.

![Figure 5](image_url)

**Figure 5:** The Voting Cost and Importance of Election Effects: In an electorate of size 20, a higher cost to benefit ratio leads to lower turnout for all sizes of the majority faction. The vertical axis shows the percentage increase in turnout when the net cost of voting is lowered by one third. The horizontal axis shows the size of the majority coalition.

The fourth electoral regularity is the competition effect: turnout is higher when the election is expected to be close (Shachar and Nalebuff 1999). The reason in
our model is that the probability that there will be a pivotal voter is higher when
the election is expected to be close. It should be noted that this appears to be true,
as illustrated in Figure 6, but it is not obvious why this is the case.

![Graph showing the relationship between the size of the majority coalition and the probability of voting.](image)

**Figure 6:** The Competition Effect: The closer in size the majority and minority coalitions, the higher the probability of voting. The election size is twenty.

The fifth electoral regularity is the *underdog effect*: in a two-party election, turnout is generally higher among voters for the less popular alternative. In our model, this is because when the election is decided by a single vote, a minority voter is more likely to be pivotal. Figure 7 illustrates the underdog effect, which also is far from obvious.

### 5 The Logic of Distributed Effectivity

Comparative static voter turnout phenomena, verified analytically for a very small electoral size in the previous section, but reflecting voter behavior in large elections, lend support to the notion that *people behave in large elections rationally and strategically as though they were actually involved in very small elections*. People appear to follow a logic that may be described as *distributed effectivity*: in canonical public life, maximize utility assuming your probability of having a pivotal effect on the outcome is high (Levine and Palfrey 2007).

The importance of distributed effectivity cannot be overstated. The character
Figure 7: The Underdog Effect: Voter Turnout is higher for members of the minority coalition.

of our species as *Homo ludens* emerged from an extended evolutionary dynamic during which, until very recently, humans lived in small hunter-gatherer bands in which all political activity was doubtless consequential (see Section 9). In such settings the logic of distributed effectivity might well differ from classical rationality with self-interest supplemented by other-regarding and universalist preferences (see Section 7) in relatively minor ways. Even the rise of settled trade and agriculture some 10,000 years ago, followed by the appearance of states and empires, might well have proceeded with little need for so strong a notion of social rationality as that embodied in distributed effectivity. But the collective actions that overthrew despotic central authorities and augured the emergence of democratic political orders dedicated to the rule of law and the protection of individual freedoms lie completely outside the range of classical rational choice theory. Distributed effectivity, nurtured in the formative years of our species’ history, made the modern world possible.

Distributed effectivity is related to, but not equivalent to, *rule-consequentialism* (Harsanyi 1977, Coate and Conlin 2004, Roemer 2010, Hooker 2011). Rule-consequentialism is the principle that like-minded agents may collectively choose a rule that maximizes the net payoff to group members. By contrast, distributed effectivity assumes only that canonical participants maximize their individual preference orderings. Individual *i*'s cost of not abstaining *dₖ* and payoff from winning *bₖ* are purely *personal*, and can embody any degree of selfishness, altruism, intent to signal prosociality, or feelings of social obligation. The non-classical element in distributed effectivity is the treatment of one’s actions as consequential when they are classically nonconsequential. We can confirm distributed effectivity reasoning not only through the regularities of social behavior, but by the testimony of social
actors themselves. By contrast, rule-consequentialism is a complex analytical theory that is foreign to the minds of most canonical participants, and that they would likely reject as an explanation of their personal behavior.

Distributed effectivity is more closely related to team-based reasoning (Gilbert 1989, Tuomela 1995, Searle 1995, Bacharach 2006, Bacharach et al. 2006). Like distributed effectivity, team reasoning models assume the decision-maker is committed to being part of a social process, and so performs his part in the social process even when this conflicts with personal goals. However, accounts of team reasoning regularly assume that individual participants are consequential, in sharp contrast to the assumptions of the logic of distributed effectivity.

The status of distributed effectivity as a form of social rationality implies that people are perfectly rational in assenting to such assertion as “I am helping my candidate win by voting” and “I am helping promote democracy by demonstrating against the dictator.” These assertions are rigorously correct, despite the nonconsequential nature of the acts of individual minds. Because distributed effectivity is so ingrained in our public persona, people untrained in traditional rational decision theory simply reject the argument that it is irrational to vote or to participate in collective actions, even when they can be persuaded that their actions are nonconsequential. They are, indeed, wise in doing so.

6 Comparison with Other Explanations of Voter Behavior

The most obvious alternative to distributed effectivity is that canonical participants people believe their actions are consequential even when they are not (Quattrone and Tversky 1988), so they act as though their actions determine outcomes with substantial probability. This is the most common, though rarely explicitly stated, assumption in the political science literature. For instance, Duncan Black’s famous median voter theorem (Black 1948) implicitly assumes that a self-interested citizen will vote and this vote will register his personal preferences. Similarly, Anthony Downs, a pioneer in the application of the rational actor model to political behavior (Downs 1957a) describes his model as follows:

Every agent in the model—whether an individual, a party or a private coalition, behaves rationally at all times; that is, it proceeds toward its goals with a minimal use of scarce resources and undertakes only those actions for which marginal return exceeds marginal cost. (Downs 1957b, p. 137)

And yet, almost immediately after stating this assumption, he writes:
[We assume that] voters actually vote according to (a) changes in their utility incomes from government activity and (b) the alternatives offered by the opposition (Downs 1957b, p. 138).

These two assumptions are compatible only if agents believe that their votes are consequential.

But in fact canonical participants generally do not believe that their behavior is consequential. For instance Enos and Fowler (2010) report a study in which the median respondent to the question as to the chance their vote will change the outcome of a presidential election gave the answer 1 in 1000, which although small, is in fact too large by a factor of at least 10,000. The authors write:

However… over 40% of regular voters know that the chances of a pivotal vote are less than one in a million… [Moreover], the less likely you are to think your vote will actually matter, the more likely you are to vote.

Similarly, in a Wisconsin survey reported in Dennis (1970), 89% of respondents disagree with the statement “So many other people vote in the national elections that it doesn’t matter much to me whether I vote or not.” Moreover, 86% of respondents agree with the statement “I generally get a feeling of satisfaction from going to the polls to cast my ballot,” and 65% of respondents disagree with the statement “A person should only vote in an election if he cares about how it is going to come out.” Thus, although voters behave strategically (Fedderson and Sandroni 2006), they know that their behavior is nonconsequential (Edlin et al. 2007, Hamlin and Jennings 2011).

Another alternative is that people consider voting a duty or social obligation (Riker and Ordeshook 1968, Fedderson and Sandroni 2006, Li and Majumdar 2010, Ali and Lin 2013). Abstaining in this view an unethical act of free-riding on the altruism of others. Indeed, in an American survey, when asked if the good citizen must always vote, the level of agreement is just slightly lower than obeying the laws and paying taxes (Dalton 2008). In an Annenberg study of the 2000 election, 71% of Americans agreed that they felt guilty when they failed to vote. Even among those who reported that they had not voted, nearly half said they felt guilty. Blais (2000) reports that more than 90% of respondents in two Canadian provinces agree that “it is the duty of every citizen to vote.” Clarke et al. (2004) similar findings for British voters.

However, the duty to vote cannot explain why voters appear to follow a logic of rational choice. Duty cannot explain strategic voting, or the size of election, competition, importance of election, or underdog effects described in Section 4. Duty can plausible explain the social network effect and the voter cost effect, but
the other indications of voter rationality make no sense when agents know that their actions are nonconsequential.

Another alternative is that many voters are altruistic, voting out of concern for the well-being of others who will be affected by the outcome of the electoral process (Schram and Sonnemans 1996, Fowler 2006, Fowler and Kam 2007, Edlin et al. 2007, Faravelli and Walsh 2011, Evren 2012). If voting is nonconsequential, a single voter cannot affect the well-being of others. However, when there may be many millions of others, the one in ten million or one in a hundred million chance of changing the outcome of the election, when multiplied by the number of people thereby affected, becomes a significant quantity. Formally, altruism can be expresses as a very large benefit $b_i$ to agent $i$ from winning, which is equivalent to a very small net cost of voting $c_i$. Were the altruism assumption plausible, then, our comparative static results could be reproduced even with large electorate size. However, it is implausible that large numbers of canonical participants act from a charity motive. Many canonical participants have interests that are far narrower than the citizenry as a whole, and often act to promote the interests of one small group of citizens at the expense of society as a whole. Indeed, it is common to hear a small group of voters deemed “selfish” because they promote their own parochial interest above the good of society. Perhaps more telling, the altruism model cannot explain the strategic rationality of voters and the comparative static results reported in Section 4. moreover, the altruism aspect of voting, to the extent that it exists, is incorporated directly into the distributed effectivity model.

A related alternative is that voters seed social approval from their social network members (Knack 1992, Harbaugh 1996, Gerber et al. 2008, Gerber and Rogers 2009, Fosco et al. 2011, Ben-Bassat and Dahan 2012, Aytemur et al. 2014). Like the altruism theory, this may be partially true, but the effect can be incorporated in the cost of abstaining variable $d_i$. Like the altruism theory, it is unlikely to stand on its own. The reason is that people do not generally care whether or not their colleagues, relatives, or neighbors vote. Moreover, even should voting send a desirable signal to others, there would be no reason to vote strategically. Nor would the observed comparative static results follow unless rather ad hoc assumptions concerning social approval are deployed.

A final alternative to distributed effectivity is expressive theory, according to which canonical participants abandon instrumental rationality in favor of expressive actions from which they derive direct utility (Sears et al. 1980, Brennan and Lomasky 1993, Rotemberg 2009, Schuessler 2000, Hamlin and Jennings 2011). Expressive models explain many of the key social aspects of canonical behavior in the public sphere, including the social network effect and the responsiveness of agents to exhortation by activists. But they do not explain why people consider participating a prosocial act and feel guilty having failed to participate. It also
 fails to explain why people are rewarded with social approval when they participate. Finally, it explains none of the rational behavior described in Section 4. Most important, it does not explain strategic voting without invoking *ad hoc* preferences.

7 Self-Regarding, Other-regarding, and Universalist Rational Action

Rational actors exhibit three types of motives in their daily lives: *self-regarding*, *other-regarding*, and *universalist*. Self-regarding motives include seeking personal wealth, consumption, leisure, social reputation, status, esteem, and other markers of personal advantage. Other-regarding motives include valuing reciprocity and fairness, and contributing to the well-being of others. Universalist motives are those that are followed for their own sake rather than for their effects. Chief among universalist goals are *character virtues*, including honesty, loyalty, courage, trustworthiness, and considerateness. Of course, in the private sphere such universalist goals have consequences for those with whom one interacts, and for society as a whole. But one undertakes universalist actions *for their own sake*, beyond any consideration of their effects.

Agents will generally trade off among these various motives. For instance, being honest may be personally costly or reputationally rewarding, and may either hurt or benefit others whose well-being one values. Universalist motives thus do not reduce to self- or other regarding motives, but they do trade off against these other motives.

8 Private and Public Persona

The individual immersed in consequentialist everyday life expresses his *private persona*, while his behavior in the public sphere reveals his *public persona*. Individuals acting in the public sphere, are, then a different sort of animal, one which Aristotle called *zoon politikon* in his *Nicomachean Ethics*. The concept of a non-consequentialist *public persona* suggests a two by three categorization of human motivations, as presented in Figure 8. In this figure, the three columns represent three modes of social interaction. The *self-regarding* mode represents the individual whose social behavior is purely instrumental to meeting his personal needs, while the *other-regarding* represents the individual who is embedded in a network of significant social interactions with valued others, and the *universal* represents the individual who values moral behavior for its own sake. The two rows represent the agent’s *private persona* of social relations in civil society, and the agent’s *public persona* of political relationships in the public sphere.

*Homo Economicus* is the venerable rational selfish maximizer of traditional
economic theory, *Homo Socialis* is the other-regarding agent who cares about fairness, reciprocity, and the well-being of others, and *Homo Vertus* is the Aristotelian bearer of non-instrumental character virtues. The new types of public *persona* are *Homo Parochialis* votes and engages in collective action reflecting the narrow interests of the demographic, ethnic and/or social status groups with which he identifies. There is strong evidence, in fact, that voters are generally swayed not by their personal experience, say with unemployment, but rather by that of the social networks within which they are embedded and with which they identify (Markus 1988, Abrams et al. 2011).


Non-canonical agents acting in the political sphere, for instance politicians, are properly located in the private *persona* row. The individual whose private *persona* is other-regarding is generally considered altruistic, whereas the individual whose public *persona* is other-regarding (*Homo parochialis*) is often considered selfish, acting in a partisan manner on behalf of the specific interests of the social networks to which he belongs. In terms of our typology, however, *Homo Parochialis* is in fact altruistic, sacrificing on behalf of the interests of members of these social networks.

9 Evolutionary Emergence of the Public Sphere

Like Aristotle’s *zoon politikon*, we are political creatures by nature, and are unique in this respect. How might a species incorporating an important public sphere have arisen?

The social life of most species, including mating practices, symbolic communication, and power relations, is expressed in genetically-grounded stereotypical form (Alcock 1993, Krebs and Davies 1997). *Homo sapiens* is unique in adapting its social life in highly flexible and deeply ways to environmental and social challenges and opportunities (Richerson and Boyd 2004). This flexibility is based
on two aspects of our mental powers. The first is our ability to devise new rules of social life, and to base our social interactions on these new rules. This capacity, absent in other species, makes us Homo Ludens: man the game player. This capacity is possessed even by very young children who invent, understand, and play games for fun. In adult life, this same capacity is exercised when people come together to erect, maintain, and transform the social rules that govern their daily transactions. Broadly speaking, then, we see the public sphere as the arena in which society-wide rules of the game are created, evaluated, and transformed, and politics as the cooperative, conflictual, and competitive behaviors through which rules are established and individuals are assigned to particular public positions.

The emergence of bipedalism, cooperative breeding, and lethal weapons (stones and wooden spears) many hundreds of thousands of years ago in the hominin line, together with favorable climate change, made the collaborative hunting and scavenging of large game fitness enhancing (Whiten and Erdal 2012, Tomasello 2014, Gintis et al. 2015). Lethal weapons are the most unique of these innovations, for other predators, such as lions, tigers and other big cats, wolves, foxes and other canines, use only their natural weapons—sharp claws and teeth, powerful jaws and great speed—in hunting, while none of these endowments was available to early hominins.

Lethal hunting weapons, moreover, transformed human sociopolitical life because they could be applied to humans just as easily as to other animals. The combination of the need for collaboration in hunting and the availability of lethal weapons in early hominin society undermined the social dominance hierarchy characteristic of primate and earlier hominin groups, which was based on pure physical prowess: the alpha male was the strongest member of the group and had dictatorial powers. The successful sociopolitical structure that ultimately replaced their ancestral social dominance hierarchy was an egalitarian political system in which lethal weapons made possible group control of leaders, group success depended on the ability of leaders to persuade and motivate, and of followers to contribute to a consensual decision process. The heightened social value of non-authoritarian leadership entailed enhanced biological fitness for such leadership traits as linguistic facility, ability to form and influence coalitions, and indeed for hypercognition in general (Boehm 1999, Gintis et al. 2015).

This egalitarian political system persisted until some 10,000 years ago when cultural changes in the Holocene involving settle trade and agriculture entailed the accumulation of material wealth, through which it became possible once again to sustain a social dominance hierarchy with strong authoritarian leaders who could buy a modicum of protection and allegiance from well-rewarded professional soldiers and clansmen (Richerson and Boyd 2001). Yet, despite the power of authoritarian states, the zoon politikon that social evolution had nourished over tens of
thousands of years was not erased by a few thousand years of Holocene history. Indeed, the extremely high level of tribal and clan warfare prevalent until recent centuries doubtless favored groups whose members conserved the hunter-gatherer mentality of political commitment and the desire for personal political efficacy (Pinker 2011).

10 Conclusion

This paper has provided evidence for a model of human behavior based on a socially rational actor model, in which individuals have both private and public persona, and their preferences range over self-regarding, other-regarding, and universalist modes in both the private and the public sphere. Morality in this model is defined in behavioral terms: moral choices are those made in social and universalist modes. The public sphere in this model is an arena where preferences and actions are primarily nonconsequentialist. The other-regarding preferences of Homo Socialis and the character virtues of Homo Vertus are underpinnings of civil society, while Homo Parochialis and Homo Universalis make possible the varieties of political life characteristic of our species.

This taxonomy of human motives has several important implications for a theory of political behavior.

- Despite the ubiquity of the assumption that rational individuals have personal interests which they register through electoral processes and collective actions, the notion is incoherent, ineluctably entailing faulty reasoning. Private persona individuals, whether Homo economicus, Homo socialis, or Homo vertus, will simply not participate in such processes, and those who do are canonical participants whose political preferences are constituted by the social networks in which they are embedded as Homo Parochialis, and the higher-level moral principles to which they adhere as Homo Universalis.

- Private sphere costs and benefits may play a large role in whether an individual participates in electoral processes or collective actions, but they have little or no effect on his electoral preferences or which collective actions he supports. Thus we should not be at all surprised when abstract moral principles appear to trump economic interests in individual economic decisions.

- The fact that the canonical participants are a mix of Homo parochialis and Homo Universalis explains why political movements are sensitive to issues of justice and fairness and insensitive to issues of social efficiency when the latter conflict with the former. For instance, voters typically care about cor-
ruption, workers’ rights, graft, and unemployment but not rates of economic
growth or measures of wealth dispersion.

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