Intuitive political theory: People's judgments about how groups should decide

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Abstract
Societies must make collective decisions even when citizens disagree, and they use many different political processes to do so. But how do people choose one way to make a group decision over another? We propose that the human mind contains an intuitive political theory about how to make collective decisions, analogous to people's intuitive theories about language, physics, number, minds, and morality. We outline a simple method for studying people's intuitive political theory using scenarios about group decisions, and we begin to apply this approach in three experiments. Participants read scenarios in which individuals in a group have conflicting information (Experiment 1), conflicting interests (Experiment 2), and conflicting interests between a majority and a vulnerable minority who have more at stake (Experiment 3). Participants judged whether the group should decide by voting, consensus, leadership, or chance. Overall, we find that participants prefer majority-rule voting over consensus, leadership, and chance when a group has conflicting interests or information. However, participants' support for voting is considerably diminished when the group includes a vulnerable minority. Hence, participants showed an intuitive understanding of Madison's concerns about tyranny of the majority.

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Societies have always struggled to make collective decisions and these predicaments are at the heart of politics. Citizens disagree about what their government should do: confront a rival nation or back down, welcome foreigners or secure the border, share wealth with the poor or let everyone fend for themselves. Societies use a variety of rules to resolve individuals' conflicting perspectives into a single choice for the group. Moreover, a given society applies different rules to make different types of choices. In the U.S., for instance, Congress uses a majority vote to pass bills, juries use consensus to determine guilt, the president unilaterally issues executive orders, and citizens elect a president through the Electoral College.

The same problem of social choice occurs in small groups of every form. Business partners divide profits, sailors navigate through a storm, farmers ration water, friends pick a restaurant, a family chooses a movie. When individuals disagree, the group needs a rule of some kind to come to a single choice. Several alternative rules are common and widespread. For instance, the group could hold a majority vote, they could follow a leader, they could debate until a consensus is reached, or they could choose randomly with a coin flip.

Social choice theory analyzes the characteristics and advantages of different systems for making collective decisions (Arrow, 1951; Arrow et al., 2010; Black, 1948, 1958; Riker, 1980; Plott, 1976; Sen, 1977, 1999; reviewed in Munger & Munger, 2015). It provides a theoretical foundation in political science for understanding society, governments, political institutions, and how groups of all kinds make collective decisions. In this mathematical framework, groups are composed of individuals who have different information or conflicting preferences, and the group's choice is determined by a *constitution,* which specifies the rules and procedures that map individuals' decisions into a single choice for the group.

Here we ask a complementary question about the psychology of social choice—how people *think* a group should make decisions. We start from the common observation that individuals in groups spontaneously propose, evaluate, and apply rules to make collective decisions. These behaviors are part of our social psychology. Posed with difficult group choices, individuals often form definite and strong opinions about how the group should decide. Especially in politics, people are often willing to argue, fight, and even die for their beliefs about how collective choices should be made. In societies throughout history, citizens have struggled over democracy, monarchy, dictatorship and other forms of government, which are denoted by the rules for social choice they endorse. When faced with collective decisions, people seem to act as natural political theorists who take firm stands on how the group should decide.

People's views about collective choice appear to be simple opinions like many others, but they might not be as ordinary as they seem. Consider that when a person sees the color red, ascends a flight of stairs, or heeds an angry scowl, nothing remarkable seems to have occurred. Yet, the science of psychology shows that perceiving color, navigating obstacles, detecting emotions, and many other ordinary experiences are incredible feats of computational engineering performed by highly structured algorithms in the mind (reviewed in Frith, 2007; Pinker, 1997). Moreover, psychology and cognitive science show how our hidden mental algorithms can be studied in experiments, exploited to produce compelling illusions, and recreated in artificially

intelligent machines (Tenenbaum et al., 2011). For example, the simple act of comprehending speech could seem to require no special explanation. But language comprehension depends on a constellation of cognitive programs that categorize phonemes, differentiate syllables, detect word boundaries, determine word meanings, organize words into syntactic structures, and other critical processes that work together to generate our intuitive understanding of a speaker's meaning (e.g., Pinker, 1994). These mental abilities are so advanced that modern computer science is only just beginning to modestly approximate their performance in speech recognition software like Siri and Alexa.

Similarly, the psychology of collective choice might have a rich underlying structure of cognitive algorithms. If so, then social choice theory and psychology can inform each other. Social choice theory can provide insight into the problems that arise in collective decisions (Hastie & Kameda, 2005), such as how voting could harm a vulnerable minority, cycle indefinitely among alternatives, or allow manipulation by agenda-setting or insincere votes (reviewed in Munger & Munger, 2015). And, it shows the strengths and weaknesses of different methods of choice, such as how well a particular rule aggregates information, increases welfare, or promotes honesty. These ideas provide insight into the problems that arise in collective decisions as well as suggesting possible psychological strategies that people might use to resolve them, such as proposing a vote or resisting a leader's unilateral policy change.

In turn, psychology can illuminate what mental abilities people bring to these problems. Most basically, the human mind has sophisticated *theory of mind* abilities for inferring and reasoning about others' mental states (reviewed in Frith & Frith, 2003). Our intuitive theory of mind gives us the ability to recognize a problem of collective choice in the first place, because it allows us to comprehend that individuals in a group have opposing beliefs or conflicting desires. Also, humans are skilled cooperators with advanced strategic abilities that enable us to work together, choose quality partners, trade resources, form alliances, and keep an eye out for cheaters (Alford & Hibbing, 2004; Axelrod, 1984). Our penchant for cooperation gives rise to many collective choices like whether a band of foragers will move to the next location, how hunters will divide a catch, whether protestors will storm the gates, or if a political party will nominate an extreme candidate.

Humans are also prolific rule-makers who create, revise, debate, and enforce explicit rules of property (DeScioli & Wilson, 2011; DeScioli & Karpoff, 2013; Ostrom, 1990), which specify who is entitled to different resources, and rules of morality, which specify the actions that are prohibited and punishable (DeScioli & Kurzban, 2009, 2013; Haidt, 2012). Human societies show a dazzling variety of moral rules about fighting, killing, stealing, lying, trading, mating, eating, and supernatural beliefs. People could use similar rule-making abilities to govern how their groups make collective decisions.

The psychology of social choice might go even further beyond these well-known cognitive substrates of social life. There are good reasons to suspect that the human mind is equipped with several rudimentary rules for collective decisions, along with abilities to devise new rules and evaluate rules proposed by others. One simple reason is that humans are highly social, and many other social animals have specialized cognitive abilities for making collective decisions, including swarms of honeybees, flocks of birds, schools of fish, and troops of gorillas

(Bajec & Heppner, 2009; Conradt & Roper, 2005; Couzin, 2009; King & Seuer, 2011; Ward et al., 2008).

More specifically, a large body of research spanning social psychology and cultural anthropology points to authority, consensus, and majority-rule voting as part of the mind's toolkit for making collective decisions. One strand of this literature surrounds *relational models theory* (Fiske, 1992; Fiske & Haslam, 2005; see also Bugental, 2000; Kenrick, Li, & Butner, 2003), which holds that humans have several basic types of relationships, each rooted in distinct cognitive mechanisms with specialized evolutionary functions. Most relevant here, each type of relationship includes a distinct rule for collective decisions (Fiske, 1992). Namely, authority relationships provide the concept of a high status leader who makes a unilateral collective choice, communal relationships provide the concept that individuals should seek and require a consensus, and exchange relationships provide the concept of majority-rule voting. Apart from its particulars, relational models theory exemplifies the basic idea that the human mind contains a repertoire of rules for making collective decisions. And additional strands of research from across the social sciences have converged on the same idea (reviewed in Hastie & Kameda, 2005).

Another clue comes from the literature on procedural justice in social psychology and political science (Dickson, Gordon, and Huber 2009, 2015; Gerber et al. 2013; Gibson 1989; Hibbing and Theiss-Morse 2001; Tyler and Blader 2003; Tyler, Casper, and Fisher 1989). These studies find that people care not only about the outcome of a decision but also about how the decision is made. The basic observation that people readily evaluate and debate decision-making procedures might reveal a special talent for collective choice. By evaluating and comparing alternative rules, people can strive to improve collective decisions, sway decisions in their own favor, and prevent others' political exploitations.

A roadmap for uncovering the psychology of collective choice

If people are natural political theorists, then psychology can provide a roadmap for how to study our intuitions about social choice. Many analogies are available from the successful study of depth perception, causal judgment, language, number, navigation, mental state reasoning, moral judgment, and other psychological phenomena (reviewed in Frith, 2007; Pinker, 1997; Tenenbaum et al., 2011). In all of these areas, researchers have found that people are natural "theorists" about depth, causality, language, number, etc. in the sense that their conclusions about the world extend far beyond their observations, similar to a scientist's theory. For instance, people's perception of depth comes from unconscious inferences from a 2D image on the retina to the hypothesized 3D environment they experience (Purves & Lotto, 2003); children's theory of language allows them to infer the grammar of their native language even though they rarely observe ungrammatical speech (Chomsky, 1965, 2007; Pinker, 1994); people's theory of causality and physics allow them to infer causation after observing only correlations (Spelke et al., 1992); people's theory of mind allows them to reason about invisible mental states like beliefs and desires (Frith & Frith, 2003); people's theory of morality allows them to judge whether an action is wrong even though wrongness is not an observable quality of the action itself (DeScioli & Kurzban, 2009, 2013; Haidt, 2012). Similarly, people's judgments

about social choice also appear theoretical in this sense, since rules like consensus, voting, and leadership are not automatically apparent in a group of disagreeing individuals, but must be inferred and theorized as imaginative solutions to these quandaries.

In all of these strands of research, the most straightforward method for uncovering an intuitive theory's structure is to present participants with a relevant scene and measure their resulting thoughts, feelings, and behavior. By experimentally varying the scene, researchers can map the input-output relations in the underlying cognitive algorithms. For instance, in research on vision the relevant scene could be a picture while the measure is a judgment of depth; in research on language the scene could be a sentence while the measure is a judgment of grammaticality; in moral psychology the scene could be an actor's behavior while the measure is a judgment of wrongness.

Following this path, we can study people's natural political theory by presenting participants with scenes in which individuals disagree about their group's choice and then measure how participants think the group should decide. By examining a multitude of controlled variations in experiments, researchers can eventually describe and understand people's intuitive theory of collective choice, just as scientific knowledge about the psychology of language, number, morality, and other mental processes greatly expanded and continues to accumulate by these methods.

The present experiments

We use scenario methods to begin to examine people's preferences for four different rules for social choice: majority rule, unanimous consensus, unilateral leadership, and chance, such as flipping a coin or drawing straws. Each of these decision rules is commonly found in political systems, and heated arguments over these rules are also common. Moreover, each rule is widely observed across cultures (Boehm, 1999; Fiske, 1992; Hastie & Kameda, 2005), which suggests that they have psychological appeal. Moreover, in a pilot study, we found that these four rules were the only ones that multiple participants spontaneously proposed for making a variety of group decisions.[1]

These four rules are more basic than much of what is studied in social choice theory. Classic social choice theory has analyzed in depth the properties of different voting systems including majority-rule voting, plurality voting, approval voting, ranked voting, weighted voting, and proportional voting. By comparison, consensus is often impractical, and chance or unilateral leadership seem undesirable (but see Amar, 1984 on lottery voting). Even so, many real-world social choices are made by leaders, consensus, or chance, which suggests that these rules have psychological appeal, practical use, and ongoing relevance. Moreover, this divide between formal theory and practice also hints at most people's limited political imagination. For instance, when asked how groups could resolve various dilemmas, none of the participants in our studies suggested approval voting, ranked voting, weighted voting, or similarly inventive voting systems; nor did they suggest a type of auction, a market, a contest of skill, an oracle, a séance,

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[1] We conducted a pilot study with scenarios similar to Experiments 1 and 2 in which participants answered an open-ended question about how the group should decide. The four decision rules of majority-rule voting, consensus, leadership, and chance were the only ones offered by more than 5% of participants for any of the scenarios.

or many other possible rules, conventions, or games seen in society. Most people do not seem to widely consider many possible rules but are instead drawn to a select few.

We do not expect that people's judgments about even four basic rules will be understood in a single investigation. If we compare to the literatures on intuitive theories about physics, biology, causality, morality, and so on, then hundreds or thousands of experiments could be required. Hence, we focus the present experiments narrowly on a few hypotheses about majority-rule voting.

We ask what majority-rule voting is for: When do people think voting is the best way to decide and when it is inappropriate? We draw on social choice theory to motivate some initial psychological hypotheses. Social choice theory has examined the usefulness and limitations of majority voting for aggregating information to resolve conflicting beliefs (Austen-Smith & Banks, 1996; Condorcet, 1785; Hastie & Kameda, 2005; Sen, 1977) and aggregating preferences to resolve conflicting interests (Arrow, 1951; Sen, 1977). Following each approach, we propose and test the psychological hypotheses that people prefer majority rule voting for problems of conflicting beliefs (Experiment 1) and conflicting interests (Experiment 2).

Social choice theory also emphasizes critical weaknesses in majority-rule voting for resolving conflicting interests (Arrow, 1951; Riker, 1982; Tullock, 1959; reviewed in Munger & Munger, 2015). These problems include difficulties surrounding vulnerable minorities, indefinite cycling, insincere votes, and agenda-setting power. We concentrate on the problem of a vulnerable minority, and we test the psychological hypothesis that people intuitively understand and avoid this problem.

The basic problem of a vulnerable minority is well-illustrated by James Madison's famous concerns about tyranny of the majority. He wrote, "When a majority is included in a faction, the form of popular government, on the other hand, enables it to sacrifice to its ruling passion or interest both the public good and the rights of other citizens," and further, "a pure democracy … can admit of no cure for the mischiefs of faction" (Federalist No. 10, Hamilton, Madison, & Jay 1788). To give a very simple example, imagine that three merchants vote on whether to take their caravan to the market in the West, where they'll earn $100, $100, and $100, respectively, or the East, where they'll earn $110, $110, and $10—slightly more money for the first two merchants and much less for the third merchant. If each merchant votes based on their own preferences, then they will choose East even though it is less efficient overall ($230 total for East versus $300 total for West). Moreover, the problem could be better solved in other ways such as bargaining where the third merchant can offer side payments to the others (e.g., $20 each if they agree to go West), which is expected to yield the efficient outcome. This basic problem of majority tyranny scales to any number of voters and to other types of payoffs such as income, resources, health care, property, legal rights, or casualties of war. Despite the high ideals of democracy, the process of majority rule does not by itself inhibit a majority from benefiting themselves at a greater expense to a minority (Tullock, 1959; Sen, 1977). In Experiment 3, we test whether people recognize this problem, as Madison did, when posed with a group of individuals with conflicting preferences and a vulnerable minority, and if it diminishes their preference for voting to resolve the group's dilemma.

In all experiments, participants read scenarios about a group of individuals with conflicting beliefs or conflicting interests, and they answer how the group should decide. To focus on our specific hypotheses, participants make their judgments as outsiders to the group rather than as members. We also use scenarios about small interpersonal groups who face everyday problems that are unrelated to politicized issues in current politics. We use this approach because if people have an intuitive political theory, then it is likely designed mainly to handle familiar decisions in small interpersonal groups; the extension of these judgments to modern political systems is likely to involve more complex cognitive processes such as imagination and metaphor which extend these natural abilities (Petersen & Arøe, 2013). These design choices allow us to examine our specific hypotheses about the structure of the problem itself, apart from many other factors that could influence judgments about particular collective choices including self-interest, political ideology, or political partisanship (e.g., Petersen et al., 2013; Petersen et al., 2014; Weeden & Kurzban, 2014).

Experiment 1

We examine how people think the group should decide when individuals have conflicting information. Participants read three scenarios about a group faced with an information aggregation problem. We designed the scenarios to reflect plausible real-world situations in which a group is faced with a (non-politicized) problem. To clarify, participants were asked what decision rule the group should use rather than which option the group should select.

We test whether individuals favor majority-rule voting over leadership, consensus, and chance for problems that require aggregating information. Hence, our main focus is the within-subject comparison of which rule was chosen over the others and the relative appropriateness of each rule within-subject.

We also vary the size of the group in between-subject conditions. The size of the group can affect the practicality and advantages of each rule. For instance, consensus is typically more difficult to achieve in large groups so participants may prefer it less as group size increases. We vary the group size from 10 which is relatively small and personal to 30 and 100 which become increasingly large and impersonal.

Methods

We recruited participants online to complete a short study (<15 min) on Amazon's Mturk website (Berinsky, Huber & Lenz, 2012). We excluded participants ($n = 3$) who failed the comprehension check (see Supporting Information), yielding a final sample of $n = 178$ (42% female; age: $M = 32.5$, $SD = 11.3$).

Participants read three fictional scenarios about a group of people facing a decision that requires aggregating information. The three scenarios were about groups that are choosing between roads to navigate to a festival, deciding whether to reinforce a wall to protect against floods, and deciding whether to try to cross a bridge that could collapse. These situations are mainly about aggregating information rather than conflicting preferences because all individuals have the same goals (reaching the destination, protection from floods, safe crossing).

Participants were randomly assigned to one of three group-size conditions in which the groups had ten, thirty, or a hundred people. In the ten-person condition, participants read these three scenarios:

Festival. *A group of ten people chartered a bus to take them to a music festival. On the way there, they get lost in an area with no cell phone service. The group comes to a fork in the road. Some people think the road on the left leads to the music festival. Some people think the road on the right leads to the music festival. They have discussed this issue for a while but haven't come to a conclusion. How should the group decide what to do?*

Flood. *A group of ten people are deciding whether to reinforce a wall to protect their farms from flood waters. Some people think the current wall will not stop the flooding unless it is reinforced. Some people think the current wall is strong enough and does not need reinforcement. They have discussed this issue for a while but haven't come to a conclusion. How should the group decide what to do?*

Bridge. *A group of ten people are deciding whether an old bridge is safe to cross. Some people think that the bridge will collapse and they should take a different, longer route to their destination. Some people think that the bridge will hold their weight and they should take the direct route. They have discussed this issue for a while but haven't come to a conclusion. How should the group decide what to do?*

We clarified in the scenarios that the group already discussed the issue so that participants did not assume that certain decision rules precluded the group from discussing the matter. (None of the rules are meant to exclude discussion.)

In the thirty-person and hundred-person conditions, participants read the same scenarios except the number of people in the group was changed in the first sentence. Participants answered "In your opinion, which of the following four decision methods is best for this situation?" by selecting leadership, unanimous consensus, majority voting, or chance. Specifically, participants selected one of the following:

(a) A leader should decide. One person should take a leadership role and make the decision for the group.

(b) The group should debate until a consensus is reached. All group members should debate the options until everyone agrees on which option to choose.

(c) The group should vote. The group should vote on the options and choose the option that receives the most votes.

(d) The group should use a chance process. The group should use a random process such as flipping a coin, rolling dice, drawing straws, or picking names out of a hat.

Next, they answered "For the next four items, rate the appropriateness of each decision method for solving the group's problem," by responding on a 7-point scale from *very inappropriate* to *very appropriate* (coded -3 to +3). Participants could explain their decision in a textbox and then answered demographic questions and a comprehension question.

Results and Discussion

We did not find effects of group size (see Supporting Information) so we combined the data across these conditions for the main analyses. Figure 1 shows participants' choices and Table 1 shows the appropriateness ratings. We focus our analysis on the most preferred decision rule for each scenario by testing whether the top choice was significantly favored over the second most preferred rule.

In the festival scenario, participants selected the top choice, voting, more often than the second choice, chance, $p < .05$ (binomial test), and they rated the top choice, voting, as more appropriate than the second choice, chance, $t(177) = 5.13$, $p < .001$ (paired t-test). In the flood scenario, participants selected the top choice, voting, more often than the second choice, consensus, $p < .01$, and they rated voting as more appropriate than the second choice, consensus, $t(177) = 3.29$, $p < .001$. In the bridge scenario, participants selected the top choice, voting, more often than the second choice, consensus, $p < .01$, and they rated voting as more appropriate than the second choice, consensus, $t(177) = 2.40$, $p < .01$.

Overall, participants chose majority-rule voting most often and as most appropriate in all three scenarios. This pattern of results generally supports the information-aggregation hypothesis for voting, which holds that people favor voting for resolving individuals' conflicting beliefs. These preferences did not depend on the size of the group (10, 30, or 100), which is somewhat surprising for consensus since it is typically more difficult to reach in larger groups. Last, we note that participants thought chance was inappropriate for the flood and bridge scenarios, but they found chance relatively appealing for the festival scenario, perhaps because no danger was at stake.
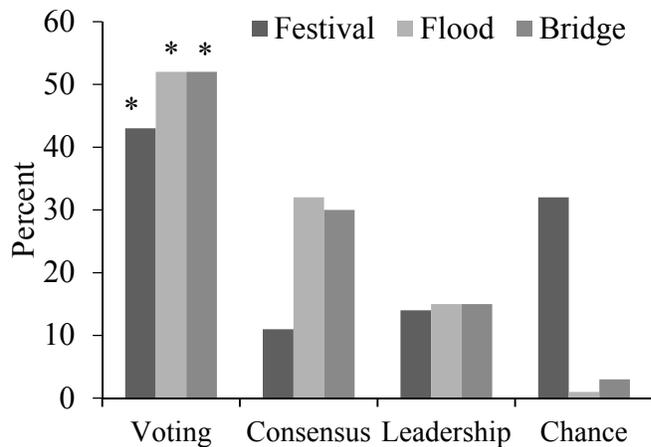

Figure 1. Participants' choices of decision rule for each scenario, Experiment 1. We indicate (*) when the most preferred option was chosen significantly more often than the second-most preferred for each scenario (see text for statistical tests).

Table 1. *Appropriateness Ratings, Experiment 1*

	M (SD)
Festival	
Voting	1.45 (1.45)[a]
Consensus	0.20 (1.75)
Leadership	0.23 (1.66)
Chance	0.48 (2.01)
Flood	
Voting	1.66 (1.40)[a]
Consensus	1.18 (1.50)
Leadership	0.06 (1.72)
Chance	-1.91 (1.39)
Bridge	
Voting	1.48 (1.55)[a]
Consensus	1.07 (1.62)
Leadership	-0.13 (1.76)
Chance	-1.42 (1.73)

Note. Participants' ratings of appropriateness (-3 to +3) of decision rules for each scenario.
[a]Indicates that the top choice was significantly preferred over the second-most preferred option.

Experiment 2

We next investigate how people think the group should decide when individuals have conflicting preferences. Participants read three scenarios about a group faced with a problem of conflicting preferences. We also vary group size as in Experiment 1. We test whether participants prefer voting for solving these problems.

Methods

We recruited participants online to complete a short study (<15 min) on Mturk. We excluded participants ($n = 7$) who failed the comprehension check, yielding a final sample of $n = 178$ (43% female; age: $M = 32.7$, $SD = 11.7$).

Participants read three fictional scenarios about a group of people facing a decision that requires aggregating preferences. The scenarios were about groups that are choosing a restaurant for dinner, choosing the destination for a day trip, and dividing a supply of water among farms. Participants were randomly assigned to one of three between-subject conditions that varied the size of the groups making the decisions: ten people, thirty people, or one hundred people. In the ten-person condition, participants read these scenarios:

Dinner. *A group of ten people are deciding where to have a dinner event. Some people want to have the event at an Italian restaurant. Some people want to have the event at a*

French restaurant. They have discussed this issue for a while but haven't come to a conclusion. How should the group decide what to do?

Day trip. *A group of ten people rented a boat and they are deciding where to go for a day trip. Some people want to go down the river to a beach. Some people want to go up the river to a waterfall. They have discussed the issue for a while but haven't come to a conclusion. How should the group decide what to do?*

Water. *A group of ten people are deciding how to divide a limited supply of water for their farms. Some people think the irrigation system should deliver water to each farm in proportion to the size of the farm. Some people think the irrigation system should deliver an equal amount of water to each farm. They have discussed this issue for a while but haven't come to a conclusion. How should the group decide what to do?*

In the thirty-person and hundred-person conditions, the number of people in the group was changed in the first sentence. The measures and procedures were the same as Experiment 1.

Results and Discussion

Group size had little effect on participants' judgments (see Supporting Information for details and exceptions), so we collapsed across group size for the main analyses.

Figure 2 shows participants' choices and Table 2 shows the appropriateness ratings. For the dinner scenario, participants selected the top choice, voting, more often than the second choice, chance, $p < .01$ (binomial test), and they rated the top choice of voting as more appropriate than the next choice, consensus, $t(177) = 8.98$, $p < .001$ (paired t-test). For the day trip scenario, participants' selected the top choice, voting, more often than the second choice, consensus, $p < .001$, and they rated the top choice, voting, as more appropriate than the next choice, consensus, $t(177) = 9.92$, $p < .001$. In the water scenario, participants selected the top choice, voting, more often than the second choice, consensus, $p < .01$, and they rated voting as more appropriate than the second choice, consensus, $t(177) = 1.77$, $p < .05$.

Overall, the results support the hypothesis that people prefer voting as a decision rule for aggregating conflicting interests. For all three scenarios, participants chose voting most often and rated it as the most appropriate decision rule. Participants' judgments did not depend on group size, as in Experiment 1.
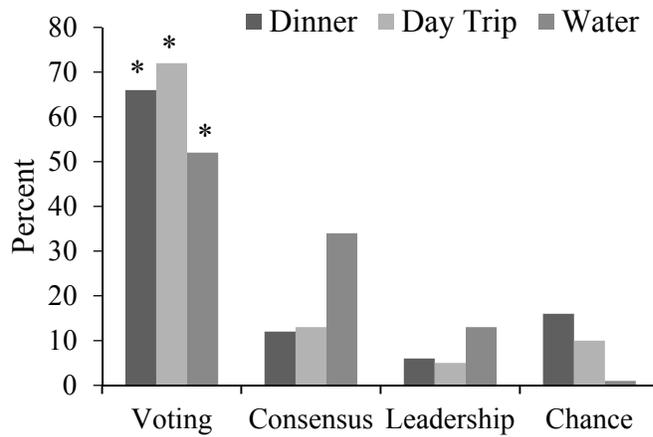
Figure 2. Participants' choices of decision rule for each scenario, Experiment 2. We indicate (*) when the most preferred option was chosen significantly more often than the second-most preferred option within each scenario (see text).

Table 2. *Appropriateness Ratings, Experiment 2*

	M (*SD*)
Dinner	
Voting	2.01 (1.15)[a]
Consensus	0.64 (1.64)
Leadership	-0.87 (1.66)
Chance	0.28 (1.73)
Day Trip	
Voting	2.10 (1.15)[a]
Consensus	0.71 (1.62)
Leadership	-0.97 (1.75)
Chance	0.06 (1.74)
Water	
Voting	1.58 (1.41)[a]
Consensus	1.30 (1.54)
Leadership	-0.53 (1.90)
Chance	-1.90 (1.30)

Note. Participants' ratings of appropriateness (-3 to +3) of decision rules for each scenario.
[a]Indicates that the top choice was significantly preferred over the second-most preferred choice.

Experiment 3

Taken together, Experiments 1 and 2 found a consistent preference for voting over consensus, leadership, and chance. These findings are consistent with information aggregation and preference aggregation theories for voting. But, they are also consistent with a more general preference for voting that could be independent of the type of problem, such as a preference based on democratic ideals or American values since our participants were American citizens. To investigate the limits of people's preference for voting, in Experiment 3 we present participants with cases that challenge the wisdom of majority rule—situations with a vulnerable minority.

Majority-rule voting can allow most people to get what they want but it does not capture the magnitudes of people's preferences. Each person gets one vote regardless of whether the collective decision will affect them a little or severely. Hence, as discussed by Madison and modern scholars (Tullock, 1959; Sen 1977, 1999), voting can result in a policy choice that does greater harm to a minority than the overall benefits it yields to the majority, which is inefficient from a utilitarian perspective.

In Experiment 3, we test the hypothesis that people intuitively understand and try to avoid the problem of a tyranny of the majority. This hypothesis predicts that participants' preference for majority rule will be diminished when a vulnerable minority has more at stake than the majority.

Methods

We recruited participants online to complete a short study (<15 min) on Mturk. We excluded participants ($n = 4$) who failed the comprehension check, yielding a final sample of $n = 117$ (49% female; age: $M = 34.7$, $SD = 13.4$).

Participants read three fictional scenarios about a group of people facing a decision that requires resolving individuals' conflicting interests. Across between-subject conditions, we manipulated the presence of a vulnerable minority. The first two scenarios were about choosing a restaurant for dinner and choosing the destination for a day trip, as in Experiment 2. The third scenario was about individuals who need to divide the profits from the sale of their company, while a few individuals worked harder than the others to build the company. We designed this scenario around a common tension in everyday life and politics about whether individuals should share rewards equally or in proportion to the effort each individual contributed (DeScioli et al., 2014). Specifically, in the vulnerable minority condition, participants read these three scenarios:

Dinner. *A group of ten people are deciding where to have a dinner event. Seven people want to have the event at a Japanese sushi restaurant. Three people cannot eat sushi because they have fish allergies and they want to have the event at an Italian restaurant instead. They have discussed this issue for a while but haven't come to a conclusion. How should the group decide what to do?*

Day trip. *A group of ten people rented a boat and they are deciding where to go for a day trip. Seven people want to go down the river to a beach. Three people do not like the beach because they sunburn very easily, and they want to go up the river to a waterfall instead. They have discussed the issue for a while but haven't come to a conclusion. How should the group decide what to do?*

Company profits. *A group of ten people are selling their software company and deciding how to divide the profits. All ten people contributed equal investments to start the company but three of the people did all of the work creating and selling the software. The seven who invested without working think the profits should be divided equally. The three who did the work think they should receive a larger share of the profits. They have discussed the issue for a while but haven't come to a conclusion. How should the group decide what to do?*

In the control condition, participants read the same scenarios except they did not specify how many people wanted each option and did not mention particular vulnerabilities (allergies, sunburn, or unequal work), as in the scenarios in Experiment 2. The measures and procedures were otherwise the same as the previous experiments.

Results

Figure 3 shows participants' choices and Table 3 shows the appropriateness ratings. For each scenario, we first analyze the most preferred rule within the control and vulnerable minority conditions, then we analyze the treatment effect for the presence of a vulnerable minority.
Dinner scenario

In the control condition, participants selected the top choice, voting, more than the second choice, consensus, $p < .001$ (binomial test), and they rated the top choice, voting, as more appropriate than the second choice, consensus, $t(57) = 5.14$, $p < .01$ (paired t-test).

In the vulnerable minority condition, participants selected the top choice, consensus, more than the second choice, voting, $p < .001$, and they rated the top choice, consensus, as more appropriate than the second choice, voting, $t(58) = 3.44$, $p < .01$. Hence, when there was a vulnerable minority, participants no longer most preferred voting and instead preferred consensus.

We next compare across the vulnerable minority and control conditions. Participants' choice of decision rule significantly differed across these conditions, $X^2(3) = 39.40$, $p < .001$. Table 3 shows the treatment effect on appropriateness ratings separately for each decision rule. Participants rated voting and chance as less appropriate in the vulnerable minority condition than the control condition. Participants rated leadership as more appropriate in the vulnerable minority condition and consensus showed no significant difference.
Day trip scenario

In the control condition, participants chose the top choice, voting, significantly more than the next choice, consensus, $p < .001$, and they rated the top choice, voting, as more appropriate than the second choice, consensus, $t(57) = 4.44$, $p < .01$.

In the vulnerable minority condition, participants' two top choices, voting and consensus, did not statistically differ, $p = .43$, and their appropriateness ratings also showed no difference between voting and consensus, $t(58) = 0.75$, $p = .23$. These results indicate that when there was a vulnerable minority, participants no longer significantly preferred voting over consensus.

Comparing across vulnerable minority and control conditions, participants' choices of decision rule significantly differed, $X^2(3) = 12.13$, $p < .01$. Table 3 shows the treatment effects for appropriateness ratings. Participants rated voting and chance as less appropriate in the

vulnerable minority condition than the control condition. Participants rated leadership as more appropriate in the vulnerable minority condition and consensus showed no significant difference.

Company scenario

In the control condition, participants' selection of the top two choices, consensus and voting, did not statistically differ, $p = .50$, and their ratings of appropriateness did not differ between voting and consensus, $t(57) = 0.64$, $p > .26$.

In the vulnerable minority condition, participants chose the top choice, consensus, significantly more than the second choice, voting, $p < .01$, and they rated the top choice, consensus, as more appropriate than the second choice, voting, $t(58) = 4.13$, $p < .01$. Hence, when there was a vulnerable minority, participants favored consensus over voting.

Comparing across vulnerable minority and control conditions, participants' choices of decision rule showed only a marginally significant difference between the vulnerable minority and control conditions, $X^2(3) = 6.82$, $p = .08$. Table 3 shows the treatment effect on appropriateness ratings for each decision rule (Table 3). Participants rated voting as less appropriate in the vulnerable minority condition than the control condition. The ratings did not differ between conditions for leadership, consensus, or chance (although chance showed a marginal difference, $p = .052$).

Discussion

These results show that participants judgments about how the group should decide were sensitive to the presence of a vulnerable minority. Participants were less supportive of voting when there was a vulnerable minority. This observation supports the hypothesis that people intuitively understand that voting can result in inefficient outcomes when some individuals are more affected than others by a collective decision. Instead, participants tended to favor consensus when there was a vulnerable minority. This observation fits the idea that requiring unanimity empowers minority groups by giving them veto power for detrimental policies.

Interestingly, participants' preferences for leadership and chance were oppositely affected by the vulnerable minority: leadership tended to be judged as more appropriate (in 2 out of 3 scenarios) whereas chance was judged as less appropriate (in 2 out of 3 scenarios). Perhaps participants assumed that a leader would recognize a vulnerable minority's needs, whereas using chance would show the group's indifference to the minority's needs.

A. Dinner
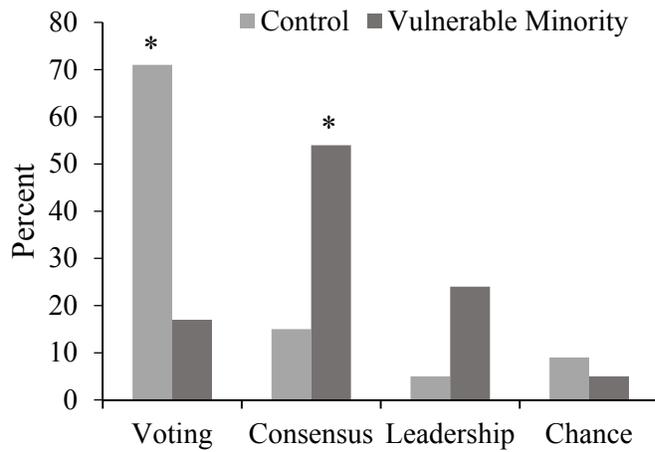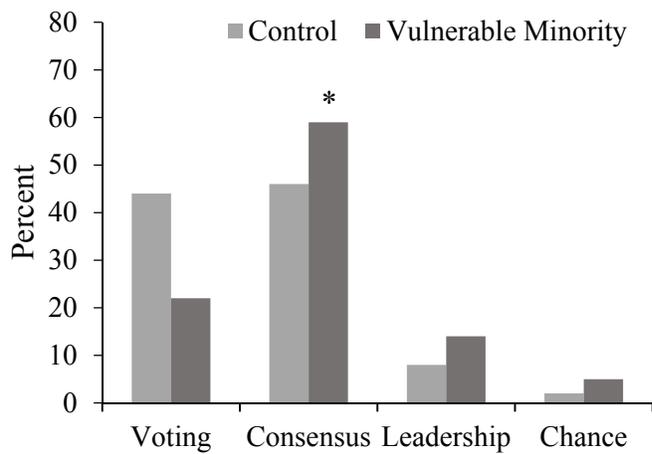

B. Day trip
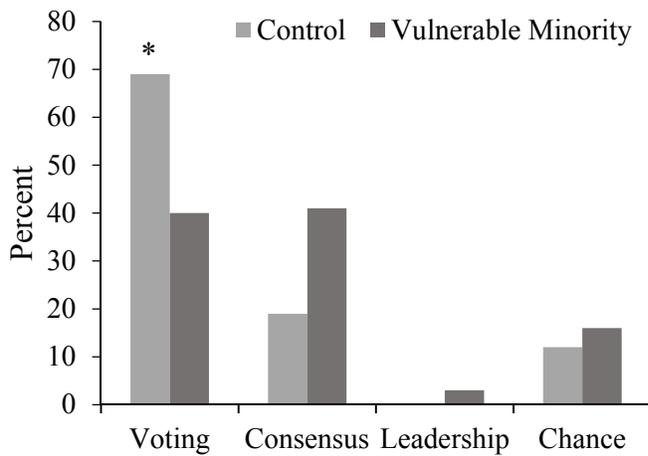
C. Company

Figure 3. Choice of decision rule by condition for the dinner (panel A), day trip (panel B), and company (panel C) scenarios. We indicate (*) when the most preferred option was chosen

significantly more often than the second-most preferred option within each scenario and condition (see text).

Table 3. *Appropriateness Ratings, Experiment 3*

	Control	Vulnerable Minority	
	M (SD)	*M (SD)*	*t*
Dinner			
Voting	2.24 (1.17)[a]	-0.02 (1.91)	7.71***
Consensus	0.82 (1.61)	1.23 (1.78)[a]	1.30
Leadership	-1.10 (1.76)	-0.11 (1.85)	2.95**
Chance	-0.58 (1.97)	-1.41 (1.83)	2.36*
Day trip			
Voting	2.23 (0.95)[a]	1.29 (1.58)	3.98**
Consensus	1.05 (1.56)	1.03 (1.74)	0.05
Leadership	-1.34 (1.44)	-0.57 (1.65)	2.71**
Chance	0.31 (1.77)	-0.56 (2.04)	2.46**
Company			
Voting	1.52 (1.77)	0.06 (2.14)	4.03***
Consensus	1.73 (1.32)	1.60 (1.63)[a]	0.48
Leadership	-0.84 (1.91)	-0.42 (1.97)	1.16
Chance	-1.98 (1.38)	-1.49 (1.84)	1.64

Note. Participants' ratings of the appropriateness of decision rules in the control (*n* = 58) and vulnerable minority (*n* = 59) conditions. The t-tests are for the mean difference in appropriateness across conditions.
[a]Indicates that the top choice was significantly preferred over the second choice.
* *p* < .05, ** *p* < .01, *** *p* < .001

General Discussion

In Experiments 1 and 2, we found that participants had a consistent preference for majority-rule voting when groups face problems of information aggregation and preference aggregation, respectively. These observations support psychological hypotheses motivated by social choice theory, which examines the benefits and limitations of voting as a mechanism for resolving individuals' conflicting beliefs or conflicting preferences (reviewed in Munger & Munger, 2015). Namely, the advantages of voting emphasized in social choice theory might explain why people have the psychological concept of majority-rule voting in the first place: for solving these common problems of collective choice in social life.

But, the results of Experiments 1 and 2 are also consistent with a more general and indiscriminate preference for voting. For instance, our American participants might embrace democratic ideals and seek to apply majority voting to any type of group problem. However,

Experiment 3 shows that there are limits to people's preference for voting. When a group includes a vulnerable minority, the preference for voting was substantially diminished. Hence, participants' support for voting was discerning and textured rather than indiscriminate. Moreover, participants had a Madisonian theory of voting since they recognized that when a group contains a vulnerable minority, majority-rule voting can do more harm than good. In these situations, participants favored consensus rather than voting.

Interestingly, people's sensitivity to minority interests also shows where they stand on an ongoing theoretical debate about whether people's utilities are comparable across individuals (Sen, 1999). Classic utilitarian philosophers like Bentham and Mill view utility as cardinal such that it can be summed and compared across individuals. However, many social choice theorists such as Arrow (1951) instead hold that utility is ordinal and cannot be compared across individuals, arguing that utility is too subjective to be compared (a mainstream view in economics). This notion persists among theorists despite its seemingly absurd implications (Ng, 1997; Sen, 1977, 1999), like that it is not possible to say whether a wealthy person's utility from a luxury vacation is less than a poor person's utility from food and shelter. The results of Experiment 3 suggest that most people are intuitive Benthamites rather than Arrovians, since they recognize that a minority's stronger preferences can outweigh a majority's weaker preferences.

People's willingness to abandon voting in certain situations points to some limits to democratic ideals and political messaging. American citizens undergo extensive enculturation and indoctrination about the merits of voting for making group decisions. Yet, our American participants were willing to discard voting when a minority's greater interests were at stake. If this occurred among Americans, then attitudes toward voting could be even more pliable in aspiring new democracies with a less developed ethos of voting. This might be especially true in nations like Iraq, Egypt, or Ukraine with persistent divides between majority and minority factions in society. Like participants in Experiment 3, citizens in these divided nations might see less hope and legitimacy in voting institutions, especially if they are members of a minority faction.

If people have flexible attitudes toward voting and other rules, then this could help explain why different institutions use different rules within a society, such as why in the U.S. the election of a president, the passage of legislation, and a defendant's guilt are decided by different rules for social choice. People's mental ability to propose, evaluate, and debate alternative rules allows citizens and policymakers to tailor different institutions to the exigencies of specific problems. If instead people's political reasoning was inflexible, and they thought one rule was always best, then they would seek to repeat a single rule throughout the political system, independent of its suitability and performance.

The same flexibility also creates room for conflict over society's rules. When citizens have conflicting interests and they foresee which rules will favor themselves, they are likely to disagree about how the group should decide (Petersen, 2015; Weeden & Kurzban, 2014). For instance, after the 2016 U.S. Presidential Election, many Democrats criticized the Electoral College as inferior to the popular vote (which they won), whereas Republicans did not, at the moment, share the same opinion of these institutions. Similarly, in subsequent months, many

Republicans supported the new President's unilateral executive orders on immigration, whereas Democrats thought these orders were unconstitutional and should be blocked by the courts.

In these cases, the rules for collective choice no longer resolve a debate but instead add another one, a meta-conflict over how the original conflict should be resolved. Indeed, higher-order conflicts could be even more vexing than the original, and applying the usual rules can lead to unending regress, such as voting on whether a leader should decide if a consensus is necessary to go forward. Indeed, multiple levels of rules routinely occur in politics, like when a judge blocks a [president's executive order that modified [the legislature's law about when [police can search a citizen for contraband]]] (brackets show nested structure).

Notably, the ability to formulate political rules into a nested, recursive structure is also a hallmark feature of other fundamental cognitive abilities including language, theory of mind, music, and mathematics (e.g., language: Chomsky, 1965, 2007; Pinker, 1994; theory of mind: Frith & Frith, 2003; music: Koelsch et al., 2013; mathematics: Lakoff & Nunez, 2000; Leslie, Gelman, & Gallistel, 2008). For instance, Chomsky (1965, 2007) argued that recursion in language is a key ingredient behind its expressive power to convey an infinite variety of ideas. Analogously, human political institutions also show incredible variety on par with language, music, and mathematics, which could be due in part to mental abilities that allow people to nest and recombine elemental rules for collective choice.

This brings us back to the analogy that spurred this investigation. People might be natural political theorists in the same way that they are intuitive theorists about physics, number, language, and minds. If so, then citizens and policymakers' thoughts and judgments about political institutions are shaped by the elements of their intuitive political theory, along with their cognitive abilities to evaluate, copy, modify, and recombine these elements (see also Boyer & Petersen, 2012). In this conception, when citizens call for a referendum, when they follow a leader to war, when an alliance of nations requires a consensus, or when a legislator invents a new political institution, these individuals draw on a constellation of mental abilities that allow them to comprehend a group's dilemma in the first place, and then to imagine, evaluate, and propose alternative rules for collective choice.

Here we developed simple scenario methods for mapping people's judgments about how groups should decide, mirroring common methods used in other areas of psychology and cognitive science. We found a few key results: participants favored voting for two major classes of social choice problems, and they departed from voting when it could harm a minority. Future research can apply these methods to a broad array of topics including features of the group's problem, the role of self-interest, polarization among factions, current politicized issues, recursive rules, and conflicts over rules.

In closing, we recall Thoreau's (1849) challenge to democratic ideals as he resisted a majority-elected government that permitted slavery—an extreme exploitation of a minority. He argued that "voting for the right is doing nothing for it" and that wise citizens "will not leave the right to the mercy of chance, nor wish it to prevail through the power of the majority." The present experiments show that people do have a strong preference for majority-rule voting, but echoing Madison and Thoreau, they also recognize its limits when a minority's greater needs are at stake.

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Supporting Information

Experiments 1-3, Comprehension Item
In all three experiments, participants answered this comprehension item to check that the read the scenario:
    Which of the following occurred in at least one of the scenarios that you read?
        a) A baby was crying for help
        b) A car was speeding out of control
        c) A couple went on a romantic date
        d) All of the above
        e) None of the above
The correct answer is: (e) None of the above. As planned in advance, participants who answered this item incorrectly were excluded from the analysis. Also, we wrote the question so that the same item could be held constant across all conditions and studies.

Experiment 1, Group Size Results
        We found that participants' choices of decision rule did not depend on group size in the concert scenario, $X^2(6) = 7.75$, $p = .26$, flood scenario, $X^2(6) = 9.48$, $p = .15$, or the bridge scenario, $X^2(6) = 7.07$, $p = .32$. Similarly, we found that group size did not affect appropriateness ratings. We conducted a 3 (group size) x 4 (decision rule) mixed factor ANOVA on appropriateness ratings in each scenario. The main effects of group size and the interactions were non-significant in all three scenarios (all $ps > .10$). In contrast, we found main effects of decision rule for the concert scenario, $F(3,525) = 19.91$, $p < .001$, flood scenario, $F(3,525) = 184.72$, $p < .001$, and bridge scenario, $F(3,525) = 109.72$, $p < .001$ (which we analyze further in the main text).

Experiment 2, Group Size Results
        For the dinner scenario, participants' choice of decision rule did not depend on group size, $X^2(6) = 4.80$, $p = .57$ (see Table S1). For appropriateness ratings, We conducted a 3 (group size) x 4 (decision rule) mixed factor ANOVA on appropriateness ratings in each scenario. The main effect of group size was not significant, $F(2,175) = 2.28$, $p = .10$. The main effect of decision rule was significant, $F(3,525) = 103.52$, $p < .001$. The interaction between group size and decision rule was significant, $F(6,525) = 2.27$, $p < .05$. Given the significant interaction, we conducted a one-way ANOVA separately for each decision rule and found a significant group size effect for consensus, $F(2) = 2.02$, $p < .01$; the effects for the other decision rules were not significant (all $ps > .10$).
        In the activity scenario, participants' choice of decision rule significantly depended on group size, $X^2(6) = 20.16$, $p < .01$. The values suggest an inconsistent effect of group size in which the 30-person group showed a different pattern from both the smaller 10-person and larger 100-person groups. Pairwise comparisons indicated that the top choice, voting, was chosen significantly more than the next choice for the 10-person, $p < .001$ (voting > consensus), 30-

person, $p < .001$ (voting > consensus), and 100-person, $p < .001$ (voting > leadership). For appropriateness ratings, a mixed factor ANOVA showed that the main effect of group size was not significant, $F(2,175) = 2.40$, $p = .09$. The main effect of decision rule was significant, $F(3,525) = 110.74$, $p < .001$. The interaction between group size and decision rule was not significant, $F(6,525) = 1.14$, $p = .337$.

In the dinner scenario, participants' choice of decision rule did not depend on group size, $X^2(6) = 3.78$, $p = .71$. For appropriateness ratings, a mixed factor ANOVA showed that the main effect of group size was not significant, $F(2,175) = 0.06$, $p = .94$. The main effect of decision rule was significant, $F(3,525) = 183.97$, $p < .001$. The interaction between group size and decision rule was not significant, $F(6,525) = 0.66$, $p = .68$.

Table S1. Forced-choice and Appropriateness Ratings by Group Size, Experiment 2

	10 People		30 People		100 People	
	%	*M (SD)*	%	*M (SD)*	%	*M (SD)*
Dinner						
Voting	70	2.21 (0.85)	59	1.78 (1.35)	70	2.03 (1.17)
Consensus	14	1.21 (1.26)	9	0.33 (1.79)	11	0.41 (1.68)
Leadership	4	-0.87 (1.64)	10	-0.84 (1.71)	6	-0.90 (1.67)
Chance	12	0.20 (1.72)	22	0.61 (1.70)	13	0.03 (1.74)
Day Trip						
Voting	79	2.42 (0.66)	59	1.82 (1.43)	78	2.07 (1.15)
Consensus	16	0.94 (1.49)	17	0.83 (1.78)	8	0.40 (1.55)
Leadership	0	-1.01 (1.78)	4	-0.96 (1.68)	10	-0.93 (1.80)
Chance	5	-1.91 (1.49)	20	2.14 (1.45)	4	-1.97 (1.23)
Water						
Voting	53	1.79 (1.20)	50	1.48 (1.50)	52	1.48 (1.51)
Consensus	30	1.28 (1.53)	34	1.32 (1.51)	38	1.30 (1.59)
Leadership	17	-0.63 (2.03)	14	-0.57 (1.90)	8	-0.39 (1.80)
Chance	0	-2.12 (1.23)	2	-1.69 (1.33)	2	-1.90 (1.32)