8-2017

Collective Intelligence: The Wisdom and Foolishness of Deliberating Groups

Joseph N. Cappella
University of Pennsylvania, jcappella@asc.upenn.edu

Jingwen Zhang
University of Pennsylvania, jzhang@asc.upenn.edu

Vincent Price
University of Pennsylvania

Recommended Citation (OVERRIDE)

Cappella, J. N., Zhang, J., & Price, V. (2017). Collective Intelligence: The Wisdom and Foolishness of Deliberating Groups. In K. Kenski & K. H. Jamieson (Eds.), The Oxford Handbook of Political Communication. New York, NY: Oxford University Press. [doi: 10.1093/oxfordhb/9780199793471.013.014]

Collective Intelligence: The Wisdom and Foolishness of Deliberating Groups

Abstract
The rise of the Internet and social media reignites interest in collective intelligence. We frame collective intelligence as follows: (1) Simple aggregation of individual opinion is a poor substitute for reasoned opinion by collectives (i.e., deliberation) except in limited circumstances. (2) What constitutes an intelligent decision on complex matters requires approximations to the ideal of what is intelligent. There is no "gold standard" for intelligent decisions. (3) If collective deliberation is to be useful, then its outcomes must be improved decisions—in short, intelligent outcomes. (4) Deliberation can lead to more intelligent outcomes when opinion, knowledge, and judgment within a collective is diverse and this diversity is expressed. (5) The trends within emerging media toward increasingly narrow, partisan sources of information, toward selective exposure and avoidance, and toward balkanization of collectives will depress the possibilities of collective intelligence that emerging media would on their surface seem to enhance.

Keywords
deliberation, decision making, Condorcet theorem, collective intelligence, expert opinion, groups

Disciplines
Communication | Social and Behavioral Sciences

Oxford Handbooks Online

Collective Intelligence: The Wisdom and Foolishness of Deliberating Groups

Joseph N. Cappella, Jingwen Zhang, and Vincent Price

The Oxford Handbook of Political Communication
Edited by Kate Kenski and Kathleen Hall Jamieson

Print Publication Date: Aug 2017
Subject: Political Science, Political Institutions, Political Behavior
Online Publication Date: Jul 2014 DOI: 10.1093/oxfordhb/9780199793471.013.014

Abstract and Keywords

The rise of the Internet and social media reignites interest in collective intelligence. We frame collective intelligence as follows: (1) Simple aggregation of individual opinion is a poor substitute for reasoned opinion by collectives (i.e., deliberation) except in limited circumstances. (2) What constitutes an intelligent decision on complex matters requires approximations to the ideal of what is intelligent. There is no “gold standard” for intelligent decisions. (3) If collective deliberation is to be useful, then its outcomes must be improved decisions—in short, intelligent outcomes. (4) Deliberation can lead to more intelligent outcomes when opinion, knowledge, and judgment within a collective is diverse and this diversity is expressed. (5) The trends within emerging media toward increasingly narrow, partisan sources of information, toward selective exposure and avoidance, and toward balkanization of collectives will depress the possibilities of collective intelligence that emerging media would on their surface seem to enhance.

Keywords: deliberation, decision making, Condorcet theorem, collective intelligence, expert opinion, groups

THE Internet has created substantial interest in and use of various forms of online collectives to generate knowledge and information and even to solve scientific problems. The best-known example is *Wikipedia* and its variants, which allow a wide variety of contributors and contributions that distill content through a combination of bottom-up and top-down processes. News outlets have allowed and even encouraged readers to offer substantive commentary on articles while communicating back to the readership which topics are being widely read, forwarded, and liked. Other more complex processes provide recommendations for movies, books, and products tailored to the interests of each user based on content and preference similarities, also known as recommendation systems (Adomavicius and Tuzhilin, 2005).

Some scholars identify all these examples as types of collective intelligence, casting a wide net to include the blogosphere and the many forms of social media as falling under the umbrella of collective intelligence (Alag, 2009). Any process by which information is collected and aggregated is treated by some as a case of collective intelligence (Bettencourt, 2009). This approach is too broad, in our opinion, both as a way to understand the strengths and weaknesses of collective information generation and certainly for the demands of this chapter.

Instead, we restrict our focus to collectives of individual who identify themselves as a group or not (voters in a congressional district as well as a company's board of directors), who must make a decision on some issue (voting for a congressional candidate; granting health insurance to domestic partners in the company) and who are in direct deliberation (board) or essentially independent decision-makers. Collective intelligence (or (p. 778) foolishness), in our view, requires an assessment of the quality of the decision reached by the collective through deliberation or through simple aggregation of judgments.[1] The focus here is on the role of deliberation in enhancing or undermining collective intelligence with collective decisions of a large group of independent (that is, nondeliberating) persons serving as the baseline of comparison.

The core issue surrounding the value and utility of these collective deliberations is captured in two articles appearing in the *New York Times* in the span of just a few days in early 2012. One extols the effectiveness of collaborative scientific inquiries made possible in large part by the ease with which collective groups of scientists can come together to work on common problems with differential but relevant expertise (Lin, 2012). The other makes clear (Cain, 2012) that intelligent, creative outcomes are as likely and sometimes more likely when people are allowed the solitude and concentration of individual deliberation. At heart, these articles contrast the power of group versus individual deliberation—the core question raised in this chapter. Are collectives capable of being more intelligent than the individuals making them up? If so, under what conditions will the deliberation of collectives yield greater wisdom than foolishness?

Although the upsurge in interest in various forms of collective intelligence—as well as its benefits and pitfalls—appears to be the result of increased attention to emerging media, the idea of collective intelligence is, in fact, an old one, having its roots in the work of John Dewey (1927, 1993), the group social psychologies of the 1950s, and studies in political communication extolling the value of deliberation for successful democracy. The core questions that emerged early in these arenas include whether groups could make better decisions than individuals and under what conditions, whether discussion assisted in the decision-making process or whether the simple aggregation of individual opinion was sufficient to enhance the quality of a decisional outcome, and under what conditions groups produced poorer—foolish—decisions rather than wiser ones.

In this chapter, we take up the question of collective intelligence through a broad review of pertinent literature crafting the following framework for collective intelligence: (1) Simple aggregation of individual opinion (or judgment) is a poor substitute for reasoned

opinion by collectives (i.e., deliberation) except in limited circumstances. However, the simple aggregation of opinions serves as the baseline for any improvement in intelligence by a collective. (2) There is no "gold standard" for intelligent decisions by groups except in the case of uninteresting problems such as how many colored balls there are in a large jar. What constitutes an intelligent decision on consequential matters of ethics, public policy, or governance requires approximations to the ideal of what is intelligent. (3) The research on deliberation in various types of collectivities has suffered from many problems —weak or nonexistent theoretical explanations, causal direction, nonindependence of observations, insufficient control, missing data, failure to show that discussion content is linked to outcomes, outcomes that are inconsequential to participants, the absence of any stake in the decision by deliberants, and so on. The most significant problem, however, has been the failure to identify outcomes that are somehow better or worse—that is more and less intelligent—as the crucial consequence of deliberative activity. Instead, outcomes have included opinion change, equality of (p. 779) contributions, satisfaction or dissatisfaction, feelings of isolation or connection, reports of greater or lesser tolerance, and so forth (Delli Carpini et al., 2004). If collective deliberation is to be useful, then its outcomes must be improved decisions, more accurate conclusions, solutions to problems that work—in short, intelligent outcomes by some standard. (4) Collective deliberations will sometimes yield greater foolishness than wisdom, poorer rather than better decisions, less effective or efficient solutions. Understanding the conditions which can enhance and retard collective intelligence is a challenge for the research community. We will examine some established factors, specifically diversity of opinion and information and its impact on collective intelligence. (5) We conclude that deliberation in collective units within society can lead to more intelligent outcomes when opinion, knowledge, and judgment within a collective is diverse at the outset and when this diversity is expressed and thus made available to others in deliberation. (6) This suggests that the trends within emerging media toward increasingly narrow, partisan sources of information, toward selective exposure and avoidance, and toward balkanization of collectives will depress the possibilities of collective intelligence that emerging media would on their surface seem to enhance.

A Baseline for Intelligent Collective Judgments: The Condorcet Jury Theorem

Cass Sunstein (2006) begins *Infotopia* with a discussion of the Condorcet jury theorem (CJT), which sets an important baseline against which to compare any collective decision made by a group in interaction to that aggregate decision of a group of people not in interaction. The CJT asks "under what conditions does the aggregate, independent judgment of a set of individuals yield a better outcome than the most competent person alone or any random person alone?"

Let us suppose that you have a decision to make with two choices, A and B (Stanford or Yale; Romney or Gingrich; policy X will work versus backfire; more white or colored balls in a large jar). You can make the decision on your own or you can consult a number of

other people and just get their votes (not their knowledge or their commentary). Which of the following would give the best decision and under what conditions? Your decision ignoring everyone else; the average decision of the group (e.g., 55 percent say Yale); the average decision of the most competent members of the group?

The answer in general is the average of the group's judgments. This is true in general but a variety of conditions need to exist. They include the following: a single, simple, distinct decision (i.e., A or B), no obvious bias affecting everyone in the group (e.g., color blindness, or all rich, or all alumni, or all pessimists); rational deliberators seeking the correct decision, not necessarily a decision that will undermine the process (e.g., voting for a write-in because democracy is a perversion!). The idea here is that averages of (p. 780) judgments are reasonable indicators and better indicators of decisions than is the case for any individual choice, given a clear decision in the face of uncertainty. For example, one would never use this approach in bridge design using a general population because the likelihood of being wrong (the probability of correct decisions not being greater than .50) for a large number of people in the sample is quite high. The CJT sets out a criterion against which decisions by deliberating groups should be set: Does deliberation enhance the quality of the outcome over what it would be for *N* people who did not deliberate?

The CJT also suggests that simple aggregation of individual judgments can often be successful, so that in this simple sense collectives have a very real chance of being intelligent under a variety of circumstances, although certainly not in general. The CJT has often been tested with relatively simple rather than complex or nuanced tasks (such as policy preferences or ethical decisions). So one issue that must be addressed is whether it is even possible to consider tasks with no clear correct or incorrect outcome. If not, then our ability to study collective intelligence may be so stymied and thus remain merely theoretical.

Is There a Gold Standard for Intelligent Decisions?

With simple technical problems such as the "desert survival problem" or group solutions to a sodoku puzzle, the quality or speed of the solution can be assessed. However, such technical problems are not very interesting and say little about real-world solutions to real-world problems, such as national debt reduction. Mercier and Landemore (2012) argue that even in the case of moral and complex policy decisions, some criteria for better outcomes are possible. Although the actual success of a selected policy may have to await future outcomes, Mercier and Landemore argue that the "epistemic bases" for such decisions are themselves indirect measures of the possible success of the policy selected. They hold that the epistemologic bases for successful decisions are important and necessary, although not sufficient, conditions for intelligent decisions.

In previous research, we have taken a similar approach, arguing that a particular measure of opinion quality—called *argument repertoire* (Cappella, Price and Nir, 2002)—is an indicator of enhanced epistemic grounding for opinion and, therefore, a necessary indicator of increased intelligence in group deliberations. Argument repertoire (AR) is derived from the conceptual and empirical work by Kuhn (1991) on reasoning in daily life. She focuses less on what people think than on *why* they think it. Kuhn's real innovation is directly eliciting and assessing *counter*arguments.

The generation of counter-arguments requires people to envision conditions that would falsify their explanations. This level of reasoning, especially if accompanied by genuine counterevidence, suggests a sophisticated knowledge of the topic well beyond that represented by reasons and evidence for one's own position. In several applications, (p. 781) coders were able to make reliable assessments of the relevant reasons people have for their opinions and reasons that others might have for holding opposed opinions.

AR is also a valid measure of anchored opinion. Those with higher AR are better educated, have greater political knowledge, more interest in politics, more exposure and attention to news, higher interpersonal communication about politics, more commitment to their political parties, and are older (Cappella, Price, and Nir, 2002). Respondents with higher AR scores are more likely to participate in online discussion groups and, once there, to talk more on topic and offer more arguments. Most important, AR is sensitive to the effects of deliberation. Those exposed to substantive conversation on specific issues have elevated AR scores after discussion (Cappella, Price, and Nir, 2002).

AR sidesteps the question of accuracy of reasons and evidence in favor of a simpler but effective measure of anchored opinion. When AR is coupled with standard measures of domain-specific factual knowledge, the two begin to triangulate the epistemic bases for intelligent decisions, as Mercier and Landemore would argue.

However, AR and domain-specific factual knowledge cannot be considered anything but indicators of intelligence regarding an issue. How can preferred solutions be assessed as wise or foolish other than waiting for future outcomes that may never be realized? One solution to this problem is to use aggregate expert opinion as a criterion for judging the success of open-ended problems. While there is no guarantee that expert opinion will yield solutions that work objectively in the real world, opinion from such a group—not from individual experts, mind you, but a group—has a higher probability of working and being fully informed than does the opinion of nonexperts or the opinion of an individual randomly selected expert, at least that is what the CJT would suggest. Such experts offer a greater chance of meeting the criteria set forward for success in the CJT, namely that their individual judgments have a probability above chance of being correct so that—in the absence of other serious biases—their aggregate opinion would be more likely to constitute a wise outcome than would be the case for a random set of individuals or a randomly selected expert.

Although no unassailable standard for assessing intelligent decisions is able to be stated, a combination of criteria establishes the epistemic bases for intelligent decisions and aggregate opinion of domain-specific experts as standards against which individual and group judgment can be assessed.[2]

Intelligent (and Foolish) Outcomes from Deliberating Groups

Intelligent Outcomes

Substantial evidence supports the finding that groups in deliberation can in some cases produce enhanced decisions in contrast to individuals or even in comparison to the (p. 782) most competent member. This has been true with mathematical and logical problems (Laughlin and Ellis, 1986; Moshman and Geil, 1998), induction problems (Laughlin, Bonner, and Miner, 2002), causes of death (Sniezek and Henry, 1989), project teams with a group history working outside the laboratory (Michaelsen, Watson, and Black, 1989, see also Bainbridge, 2002; Watson, Michaelsen, and Sharp, 1991; West and Anderson, 1996). In the research on deliberation in political science and political communication, there is a sense that more intelligent outcomes result (Barabas, 2000; Cook and Jacobs, 1998; Fishkin and Luskin, 2005; Gastil and Dillard, 1999), reviewers of this literature acknowledge (Mackie, 2006; Mercier and Landemore, 2012) the tenuous relationship between the outcome measured in most of these studies and real intelligence. For example, opinion change resulting from discussion is not a clear indicator of wisdom or foolishness, as opinions can polarize in undesirable directions.

Research from our own projects on deliberation and intelligence are worth highlighting as well. One project (gPOD^3 for “genetics, public opinion, and deliberation”) focused on deliberation by groups sampled from the general public (8 to 12 per group) who met online synchronously on three separate occasions to discuss ethical issues about genetics testing and research. Participants provided information on the epistemic bases for decision quality at various points including factual knowledge about genetics, AR regarding participation in genetics research, and structures of semantic and social networks derived from open-ended responses.

The key comparisons are between those deliberating and others in various nondeliberating control conditions. Young Min Baek (2010) explored changes in factual knowledge by investigating the effects of deliberation participation on a citizen’s basic genetic knowledge change. Active deliberation reduced “uncertainty,” in that participants became better informed by replacing uncertain knowledge with accurate knowledge. Discussion of bioethical issues mainly influences the “certainty” of their knowledge, which helps the public form more accurate understanding of an issue and thus contribute to stable and solidified opinion. Deliberation, however, does not seem to correct misinformation.

AR was also affected by deliberative activity in contrast to nondeliberating controls (Kim and Cappella, 2010). The quality of opinion—measured as the reasons for one's own and for other's opposed views—is higher for those deliberating than for those not deliberating and especially for those deliberating twice or more in contrast to those not deliberating. The findings are consistent across multiple topics about ethical issues in genetics (e.g., from "duty to warn" to "volunteering"). Deliberation affected the basis of opinion. In support of the importance of opinion anchors, Kim and Cappella (2010) also showed those with more anchored opinions having greater opinion stability over time than those with opinions formed without deliberation.

In his dissertation, Young Min Baek (2011)—also using gPOD data—examined the effect of deliberation on both social and semantic networks while taking into account the positivity and negativity of concepts. A small set of themes was identified as capturing a large percentage of ethical issues regarding genetics. Four outcome measures were examined from the network of social and semantic connections: (1) *size*—for (p. 783) example, how many ties a node has in a given social network; (2) *range*—for example, how many mediations a node enables between nodes in a given social or semantic graph; (3) *integration*—for example, the degree of interconnection within a set of nodes with the same valence in a given network; and (4) *differentiation*—for example, the degree of disconnection between two sets of nodes with opposite valence in a given network.

The most pertinent conclusions are as follows: (1) Deliberation about bioethical issues in genetics made people and concepts more highly interconnected than controls. (2) The dominant valence of the group's discussion (pro or con messages) increased (network) solidarity between people of the same valence. (3) Postdiscussion semantic networks were the result of both prediscussion networks and, more importantly, group-level semantic networks emerging from deliberation (51 of 60 groups).

Results from the gPOD project so far are encouraging regarding the epistemic bases for intelligent decisions by deliberating groups. However, gPOD has not yet employed the opinions of bioethicists as a comparison standard for deliberating versus nondeliberating participants. However, in an earlier deliberation study on healthcare reform, experts were a part of the sample whose positions offered a specific comparison to non expert members of the public.

Studies using protocols similar to gPOD have investigated health policy problems and solutions. One particularly important set of findings yielded the following pattern: that (1) groups' views on health policy change through deliberation in contrast to those not deliberating; (2) the change is in the direction of elite opinion on healthcare policy as revealed in baseline surveys; and (3) change is not dependent on having elites in the deliberating group (Price, Feldman, Freres, Cappella, and Zhang, 2005). For example, elite opinion does not favor tax solutions to health insurance problems initially, whereas citizen opinion does; but citizen opinion changes toward that of elites on this issue even when elites are not in the deliberating group. These results are encouraging.

Other evidence from the healthcare dialogue study indicates that discussion increases the complexity of opinion structures (Price, Arnold, Baek, and Cappella, 2009). Confirmatory factor analysis (CFA) and structural equation modeling (SEM) were used to examine the latent dimensions underlying multiple opinions on healthcare policies and then to test the impact of participation in the online discussions on that latent structure. Results indicate that deliberation produced a significantly more complex and differentiated structure of opinions. Comparisons between "elite" and nonelite respondents further indicate that this deliberation-induced change can be confidently interpreted as reflecting an increase in cognitive sophistication.

Baek and Cappella (2010) have studied the complexity of expressed opinion (not self-reported opinion) in discussing issues in healthcare reform over two time periods. Ordinary citizens and experts' are compared after having discussions with other experts at time one; the expressions at time two show that ordinary citizens' become more complex while those of experts become less complex. These findings indicate that citizens learn the complexities of healthcare options over time from a low base, while experts refine the complex views with which they begin to become more focused on the positions they believe are most effective.

(p. 784) Both existing and new research indicate that deliberation can affect both the epistemic bases for and quality of policy recommendations with deliberation. This conclusion certainly does not and cannot mean that deliberating groups will necessarily produce intelligent outcomes.

Foolish Decisions

Groups do not always make better decisions. Summaries of the literature make clear that certain processes common in group deliberation can distort the information available to discussants through suppression of minority opinion, polarization, and the development of risky shifts (Laughlin, 2011; Turner, 1991). Sunstein (2002, 2008) popularized some of the problems in group deliberation using language that makes clear their consequences for collective intelligence. (1) The predeliberation errors of group members can be amplified, not merely propagated, as a result of deliberation. (2) Groups may fall victim to cascade effects, as the judgments of initial speakers or actors are followed up in successive commentary, while contrary information is withheld (Bikhchandani et al., 1992; Banerjee, 1992; Chamley, 2004). Nondisclosure may be a product of either informational or reputational cascades. (3) Group polarization can lead to more extreme judgments in line with the group's predeliberation dispositions (Nocetti, 2008). Although polarization can lead in desirable directions, there is no assurance of this consequence. (4) In deliberating groups, shared information often dominates or crowds out unshared information, reducing diversity of information and ensuring that groups do not acquire the full range of information available.

Factors Affecting Intelligent Decision-Making Through Deliberation

Researchers have long held that high-quality group decisions depend on the diversity of opinion expressed in group deliberations. Taylor and Faust (1952) claimed that group decisions were superior to individual decisions because groups presented more views of the problem and greater information pertinent to solutions. Since Janis (1982) proposed that successful handling of the Cuban Missile Crisis in 1962 resulted in part from Robert Kennedy playing the role of "devil's advocate," this has been considered one of the prototypical intervention strategies to improve group decision-making performance. The mechanism for improved decisions in "devil's advocate" (DA) procedures may very well be that it increases opinion diversity. SunWolf and Seibold (1999) conclude from their (p. 785) review that the DA procedure improves group decisions; but the groups included only students and focused on well-defined decision tasks. Salazar (1997) found that opinion similarity in groups decreased task-relevant communication, while diverse prior opinions worked to enhance both communication and decision quality. Maznevski (1994) showed that ethnic and cultural diversity improved decision-making performance, again presumably because the information about and frames for viewing alternative outcomes were more diverse. The evidence from controlled group experiments supports Stasser's (1992) conclusion that the quality of group decisions depends significantly on the diversity of information discussed. When status diversity reflects variance in knowledge, expertise, and values, then status diversity can increase the likelihood of high-quality decisions (Berger et al., 1977; Kirchler and Davis, 1986).

Research in political deliberation and political talk has shown that "disagreement" can provide exposure to multiple perspectives and is thus thought to foster the kind of careful reflection needed to arrive at a reasoned opinion. For example, Arendt (1968, 241) stresses the importance of exposure to oppositional views for encouraging an "enlarged mentality," or the ability to form a more representative, informed opinion by considering a particular issue from alternative standpoints. In the view of deliberative theorists, then, political disagreement (or expressed diversity) should enhance learning. Social networks research also suggests that weaker, more heterogeneous ties carry a higher likelihood of transmitting novel information (Granovetter, 1973; Weimann, 1982). Kwak, Williams, Wang, and Lee (2005) and Scheufele et al. (2004) found that talking with people from diverse sociopolitical backgrounds is related to political knowledge.

Exposure to political disagreement has shown that network diversity fosters a better understanding of multiple perspectives on issues (Mutz, 2002a; Price et al., 2002). The ability to rationalize other people's viewpoints might be considered an indirect measure of fact-based issue knowledge. Although one's repertoire of arguments may very well be expanded via political disagreement, this is not to say that these arguments and the issues that support them are necessarily conveyed or interpreted accurately.

Feldman and Price (2008), analyzing data from online group deliberations about the 2000 presidential election, report an interaction effect between amount of political discussion and the perceived disagreement present in discussion networks. Those with the lowest levels of factual knowledge about political issues are embedded in low disagreement networks with little political talk. Those in high-disagreement networks or low-disagreement, high-talk networks have elevated issue knowledge. Although these data are about people talking politics with others, disagreement plays a consequential role in advancing issue knowledge measured as accurate responses on political issue questions.

Political deliberation is not the only source of support for claims about the importance of information heterogeneity. For example, Giles's (2005) study compares the quality of *Wikipedia* articles to those of the *Encyclopedia Britannica* in terms of the number of acknowledged errors finding them comparable. Surowiecki (2005) **(p. 786)** suggests that the aggregate knowledge of a large group can be superior to that of a single or small set of experts when diversity of opinion, independence, decentralization, and aggregation characterize the collective. Arazy, Morgan, and Patterson (2006) tested forty-two *Wikipedia* articles to determine the effect of crowd size and diversity on article quality. Quality was defined as the number of errors; crowd size was the number of authors plus number of edits. Diversity was measured as the number of words in the discussion page and the number of edit wars. The results showed that size and diversity had positive effects on quality (see also Arazy, Nov, Patterson, and Yeo, 2011).

Woolley et al. (2010) had small groups of people working on a wide variety of tasks. The groups were shown to have a general "group intelligence," in that performing well on one kind of task was also associated with performance on other quite unrelated tasks. This group intelligence is only weakly related to the average intelligence of individuals in the group or to the intelligence of the most intelligent person. However, it is strongly related to social sensitivity of the group members and to more symmetric distribution of discussion in the group. This equality of discussion is important to information sharing and to effective performance on the assigned tasks. Group intelligence results in large part from social skills inviting the sharing of whatever diverse information and skill is present in the group.

Summary, Implications, and Next Steps

The purpose of this essay has been to invite researchers to reactivate interest in an old problem in the context of the interest created by emerging media in the promise of collective deliberation yielding intelligent outcomes. The old problem is obviously the situation in which groups produce higher-quality decisions than individuals in the context of interaction about those decisions. Our review suggests that deliberating groups can be effective in advancing the epistemic bases for good decisions and for enhancing the quality of decisions for certain types of tasks and for certain criteria for quality. In addition, some consensus in the research literature has emerged over the importance of expressed diver-

sity of opinion, judgment, and knowledge as one important causal factor in assuring the effect of deliberations on decision quality.

However, many challenges remain. The criteria for defining a decision as intelligent rather than foolish are open to considerable debate, especially with open-ended tasks regarding policy, ethics, and governance. We have tried a variety of approaches in our work, including using factual knowledge and argument repertoire as indicators of the epistemic bases for intelligent decisions and comparisons to aggregate elite opinion as an indicator of the quality of a group's decision. Approaches that move beyond simple opinions and judgments (even of experts) to more complex semantic network representations of complex issues hold real promise, we believe (Baek, 2011; Morgan, Fischhoff, Bostrom, and Atman, 2002), especially when aggregate semantic representations of (p. 787) elites are the comparison base for that of the deliberating group. In the end, there is no gold standard, but certainly the issue is worth attention.

Although deliberating collectives are capable of intelligent decisions, they are also capable of foolish ones. No comprehensive theoretical account has emerged for distinguishing the conditions for one or other type of decision even though specific factors such as diversity of expressed information is certainly implicated in intelligent outcomes. Other factors that will need to be considered in any account distinguishing quality of decisions will be a theory of types of tasks and vested interest in the decision's outcome. Both have received attention in the research literature (Hackman, 1969; McGrath, 1984), with the latter factor widely considered in the work on prediction markets.

As has been the case in much of the research on the consequences of political deliberation, few convincing explanations have arisen for why deliberative processes should produce changes in tolerance, engagement, and social capital. The same is true of deliberation and collective intelligence. Certainly arguments about bounded rationality, the analogy to genetic diversity and survival, and other biological analogies have appeal. However, no strong causal account has arisen even to explain why collective deliberation can be intelligent.

If expressed diversity of opinion, judgment, and knowledge is as important to intelligent decisions as some research already suggests, then social, political, psychological, and media systems factors that increase the likelihood of the balkanization of knowledge and opinion will undermine the chances of intelligent deliberation. Jamieson and Cappella (2008) and many others have addressed this issue (Sunstein, 2001, 2009), but in the context of a burgeoning interest in collective deliberation and intelligence, the effects of balkanized knowledge on deliberation—whether by elites or nonelites—take on renewed urgency.

References

Adomavicius, G., and Tuzhilin, A. 2005. Toward the next generation of recommender systems: A Survey of the state-of-the-art and possible extensions. *IEEE Transactions on Knowledge and Data Engineering* 17(6): 734–749.

Alag, S. 2009. *Collective intelligence in action*. Greenwich, CT: Manning.

Arazy, O., Morgan, W., and Patterson, R. 2006. Wisdom of the crowds: Decentralized knowledge construction in Wikipedia. Proceeding of the 16th Workshop on Information Technologies & Systems (WITS'06). Unpublished paper. Available at: **http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1025624**

Arazy, O., Nov, O., Patterson, R., and Yeo, L. 2011. Information quality in Wikipedia: The effects of group composition and task conflict. *Journal of Management Information Systems*, 27(4): 73–100.

Arendt, H. 1968. Truth and politics. In H. Arendt (Ed.), *Between past and future: Eight exercises in political thought* (pp. 227–264). New York: Viking Press.

Baek, Y. M. 2010. From uncertain to accurate: How citizens are informed in deliberation. Unpublished manuscript.

Baek, Y. M. 2011. The impact of deliberation on social and semantic networks: Citizens mental models of bioethical issues in genetics using automated textual analysis. University of Pennsylvania. ProQuest Dissertations and Theses. Available at: **http://search.proquest.com/docview/893843412?accountid=6167**

Baek, Y. M., and Cappella, J. N. 2010. When citizens meet experts: Effects of issue experts' mental models on citizens' opinion as textual network. Unpublished manuscript. Philadelphia: Annenberg School for Communication.

Bainbridge, S. M. 2002. Why a board? Group decision making in corporate governance. *Vanderbilt Law Review* 55(1): 1–55.

Banerjee, A.V. 1992. A simple model of herd behaviour. *Quarterly Journal of Economics* 107(3): 797–817.

Barabas, J. 2000. Americans discuss social security: How deliberation affects public opinion. Northwestern University. ProQuest Dissertations and Theses. Available at: **http://search.proquest.com/docview/304632708?accountid=6167**

Berger, J., Fisek, M. H., Norman, R. Z., and Zelditch, M., Jr. 1977. *Status characteristics and social interaction*. New York: Elsevier.

Bettencourt, L.M.A. 2009. The rules of information aggregation and emergence of collective intelligent behavior. *Topics in Cognitive Science* 1: 598–620.

Bikhchandani, S., Hirshleifer, D., and Welch, I. 1992. A theory of fads, fashion, custom, and cultural change as informational cascades. *Journal of Political Economy* 1005: 992–1026.

Cain, S. January 13, 2012. The rise of the new groupthink. *New York Times*. Available at: **http://www.nytimes.com/2012/01/15/opinion/sunday/the-rise-of-the-new-groupthink.html**

Cappella, J. N., Price, V., and Nir, L. 2002. Argument repertoire as a reliable and valid measure of opinion quality: Electronic dialogue in campaign 2000. *Political Communication* 19(1): 73–93.

Chamley, C. P. 2004. *Rational herds: Economic models of social learning*. Cambridge, UK: Cambridge University Press.

Cook, F. L., and Jacobs, L. R. 1998. *Deliberative democracy in action: Evaluation of Americans discuss social security*. Washington DC: Report to the Pew Charitable Trusts.

(p. 789) Delli Carpini, M. X., Cook, F. L., and Jacobs, L. R. 2004. Public deliberation, discursive participation, and citizen engagement: A review of the empirical literature. *Annual Review of Political Science* 7: 315–344.

Dewey, J. 1927. *The public and its problems*. New York: Holt.

Dewey, J. 1993. Philosophy and democracy. In D. Morris and I. Shapiro (Eds.), *John Dewey: The political writings* (pp. 38–47). Indianapolis, IN: Hackett. Original work published in 1919.

Erikson, R. S., and Wlezien, C. 2008. Are political markets really superior to polls as election predictors? *Public Opinion Quarterly* 722: 190–215.

Feldman, L., and Price, V. 2008. Confusion or enlightenment? How exposure to disagreement moderates the effects of political discussion and media use on candidate knowledge. *Communication Research* 35(1): 61–87.

Fishkin, J. S. and Luskin, R. C. 2005. Experimenting with a democratic ideal: Deliberative polling and public opinion. *Acta Politica* 40: 284–298.

Forsythe, R., Rietz, T. A., and Ross, T. W. 1999. Wishes, expectations, and actions: A survey on price formation in election stock markets. *Journal of Economic Behavior and Organization* 39: 83–110.

Foutz, N. Z., and Jank, W. 2010. Research note—Prerelease demand forecasting for motion pictures using functional shape analysis of virtual stock markets. *Marketing Science* 29(3): 568–579.

Gastil, J., and Dillard, J. P. 1999. Increasing political sophistication through public deliberation. *Political Communication* 16: 3–23.

Giles, J. 2005. Internet encyclopedias go head to head. *Nature* 438(15): 900–901.

Granovetter, M. 1973. The strength of weak ties. *American Journal of Sociology* 78: 1360–1380.

Hackman, J. R. 1969. Toward understanding the role of tasks in behavioral research. *Acta Psychologica* 31: 97–128.

Jamieson, K. H., and Cappella, J. N. 2008. *Echo chamber: Rush Limbaugh and the conservative media establishment*. New York: Oxford University Press.

Janis, I. L. 1982. *Groupthink*, 2nd ed. Boston: Houghton Mifflin.

Kim, J. W., and Cappella, J. N. 2010. Effects of deliberation on reasoned and stable opinions about genetics research. Unpublished manuscript. Philadelphia: Annenberg School for Communication.

Kirchler, E., and Davis, J. H. 1986. The influence of member status differences and task type on group consensus and member position change. *Journal of Personality and Social Psychology* 51(1): 83–91.

Kuhn, D. 1991. *The skills of argument*. Cambridge, UK: Cambridge University Press.

Kwak, N., Williams, A. E., Wang, X., and Lee, H. 2005. Talking politics and engaging politics: An examination of the interactive relationships between structural features of political talk and discussion engagement. *Communication Research* 32: 87–111.

Laughlin, P. R. 2011. *Group problem solving*. Princeton, NJ: Princeton University Press.

Laughlin, P. R., Bonner, B. L., and Miner, A. G. 2002. Groups perform better than the best individuals on letters-to-numbers problems. *Organizational Behavior and Human Decision Processes* 88: 605–620.

Laughlin, P. R., and Ellis, A. L. 1986. Demonstrability and social combination processes on mathematical intellective tasks. *Journal of Experimental Social Psychology* 22: 177–189.

Lin, T. January 16, 2012. Cracking open the scientific process. *New York Times*. Available at: **http://www.nytimes.com/2012/01/17/science/open-science-challenges-journal-tradition-with-web-collaboration.html**

(p. 790) Mackie, G. 2006. Does democratic deliberation change minds? *Philosophy, Politics and Economics* 10(5): 279–303.

Maznevski, M. L. 1994. Understanding our differences: Performance in decision-making groups with diverse members. *Human Relations* 47(5): 531–552.

McGrath, J. E. 1984. *Group interaction and performance*. Englewood Cliffs, NJ: Prentice Hall.

Mercier, H., and Landemore, H. 2012. Reasoning is for arguing: Understanding the successes and failures of deliberation. *Political Psychology* 33(2): 243–258.

Michaelsen, L. K., Watson, W E., and Black, R. H. 1989. A realistic test of individual versus group consensus decision making. *Journal of Applied Psychology* 74: 834–839.

Morgan, M. G., Fischhoff, B., Bostrom, A., and Atman, C. J. 2002. *Risk communication: A mental Models approach*. New York: Cambridge University Press.

Moshman, D., and Geil, M. 1998. Collaborative reasoning: Evidence for collective rationality. *Thinking and Reasoning* 4(3): 231–248.

Mutz, D. C. 2002. Cross-cutting social networks: Testing democratic theory in practice. *American Political Science Review* 96: 111–126.

Nocetti, D. 2008. The biasing effects of memory distortions on the process of legal decision-making. *Review of Law and Economics* 4(1): 314–334.

Pagon, A. 2005. Polls and markets in the 2004 presidential election: A risk premium to explain deviations between polling predictions and market prices. Department of Economics working paper, Stanford University. Available at: **http://economics.stanford.edu/files/Theses/Theses_2005/Pagon.pdf**

Price, V., Arnold, A. K., Baek, Y. M., and Cappella, J. N. 2009, Deliberation, constraint and complexity. Unpublished manuscript. Philadelphia: Annenberg School for Communication.

Price, V., Feldman, L., Freres, D., Cappella, J. N., and Zhang, W. 2005. Informing public opinion about health care reform through online deliberation. Unpublished manuscript. Philadelphia: Annenberg School for Communication.

Price, V., Nir, L., and Cappella, J. 2002. Does disagreement contribute to more deliberative opinion? *Political Communication* 19: 95–112.

Salazar, A. J. 1997. Communication effects on small group decision-making: Homogeneity and task as moderators of the communication-performance relationship. *Western Journal of Communication* 61(1): 35–65.

Scheufele, D. A., Nisbet, M. C., Brossard, D., and Nisbet, E. C. 2004. Social structure and citizenship: Examining the impacts of social setting, network heterogeneity, and informational variables on political participation. *Political Communication* 21: 315–338.

Servan-Schreiber, E., Wolfers, J., Pennock, D. M., and Galebach, B. 2004. Prediction markets: Does money matter? *Electronic Markets* 14(3): 243–251.

Sniezek, J. A., and Henry, R. A. 1989. Accuracy and confidence in group judgment. *Organizational Behavior and Human Decision Processes* 43: 1–28.

Spann, M., and Skiera, B. 2009. Sports forecasting: A comparison of the forecast accuracy of prediction markets, betting odds and tipsters. *Journal of Forecasting* 28: 55–72.

Stasser, G. 1992. Information salience and the discovery of hidden profiles by decision-making groups: A “thought experiment.” *Organizational Behavior and Human Decision Processes* 52: 156–181.

Sunstein, C. R. 2002. The law of group polarization. *Journal of Political Philosophy* 10 (2): 175–195.

Sunstein, C. R. 2001. *Republic.com*. Princeton, NJ: Princeton University Press.

(p. 791) Sunstein, C. R. 2006. *Infotopia: How many minds produce knowledge*. New York: Oxford University Press.

Sunstein, C. R. 2009. *Republic.com 2.0*. Princeton, NJ: Princeton University Press.

Sunstein, C. R., and Hastie, R. 2008. Four failures of deliberating groups. John M. Olin Law and Economics working paper no. 401, University of Chicago. Available at: **http://www.law.uchicago.edu/files/files/401.pdf**

SunWolf and Seibold, D. R. 1999. The impact of formal problem solving procedures on group processes, members, and task outcomes. In L. R. Frey (Ed.), D. S. Gouran, and M. S. Poole (Assoc. Eds.), *The handbook of group communication theory and research* (pp. 395–431). Thousand Oaks, CA: Sage.

Surowiecki, J. 2005. *The wisdom of crowds*. New York: Random House.

Taylor, D. W., and Faust, W. L. 1952. Twenty questions: Efficiency in problem solving as a function of size of group. *Journal of Experimental Psychology* 44: 360–368.

Turner, J. C. 1991. *Social influence*. Pacific Grove, CA: Brooks/Cole.

Watson, W. E., Michaelsen, L. K., and Sharp, W. 1991. Member competence, group interaction, and group decision making: A longitudinal study. *Journal of Applied Psychology* 76: 803–809.

Weimann, G. 1982. On the importance of marginality: One more step in the two-step flow of communication. *American Sociological Review* 47: 764–773.

West, M. A., and Anderson, N. R. 1996. Innovation in top management teams. *Journal of Applied Psychology* 81: 680–693.

Wolfers, J., and Zitzewitz, E. 2009. Using markets to inform policy: The case of the Iraq War. *Economica* 76: 225–250.

Wolfers, J. and Zitzewitz, E. 2004. Prediction markets. *Journal of Economic Perspectives* 18(2): 107–126.

Woolley, A. W., Chabris, C. F., Pentland, A., Hashmi, N., and Malone, T. W. 2010. Evidence for a collective intelligence factor in the performance of human groups. *Science* 330: 686–688. (p. 792)

Notes:

(1.) Public opinion is not concerned with the quality of the outcome rendered by the expressed opinions, just their outcome.

(2.) Another approach to defining tasks whose outcomes can be compared to real-world decisions is the use of prediction markets to predict future events (Servan-Schreiber et al., 2004; Wolfers and Zitzewitz, 2004), such as the success of upcoming movies (Foutz and Jank, 2010), political stock markets (Forsythe et al., 1999) and sports betting markets (Spann and Skiera, 2009), as well as election outcomes (e.g., in contrast to political polling results) (Erikson and Wlezien, 2008; Pagon, 2005; Wolfers and Zitzewitz, 2009). However, these forums for collective intelligence replace deliberation with online monetary decisions; therefore, while relevant to collective decision making, they are irrelevant to deliberative processes except under the most generous interpretation of the equivalence of betting with the exchange of symbolic information.

(3.) Research from gPOD is mostly unpublished or currently under review. For a copy of the final report from this project, providing some of the detailed results and analyses, or for copies of individual papers cited, contact the first author.

Joseph N. Cappella

Joseph N. Cappella (Ph.D., Michigan State University, 1974) is the Gerald R. Miller Professor of Communication at the Annenberg School for Communication at the University of Pennsylvania. His research focuses on the effects of persuasive messages in health, political, and interpersonal contexts. He is an elected Fellow of the International Communication Association and a Distinguished Scholar of the National Communication Association.

Jingwen Zhang

Jingwen Zhang is a doctoral student at the Annenberg School for Communication at the University of Pennsylvania. Her research focuses on the effects of persuasive messages and communication modalities of the Internet and online social media in the health context.

Vincent Price

Vincent Price (Ph.D., Stanford University, 1987) is Provost of the University of Pennsylvania and the Steven H. Chaffee Professor of Communication at the Annenberg School for Communication. A scholar of public opinion, social influence and political communication, he is former Editor of Public Opinion Quarterly and the recipient of a number of awards for his teaching and research.