A VALUE-BASED DESIGN APPROACH FOR ONLINE DELIBERATION

Sanju Menon, Weiyu Zhang
Department of Communications and New Media
National University of Singapore
Singapore

Abstract: *This paper presents a theory-driven approach for the design of online deliberation platforms. We start with a brief overview of recent trends in deliberative research, capturing in particular 5 salient values of deliberative democracy namely- Impartial accessibility, Reasonable discourse, Epistemic value, Binding Decisions and Dynamicity. These deliberative values will then be used to review the effectiveness of current online deliberation approaches. We then explicate the challenges involved in such value-based design for deliberation and propose our own set of 11 design approaches that can help improve the legitimacy of online deliberative processes.*

Keywords: Online deliberation, Value-based design, Reasonable discourse, Impartial accessibility, Epistemic value, Dynamicity, Binding decisions, Legitimacy

There is growing global dissatisfaction with modern day democratic models. Public surveys have shown a deepening distrust in many countries about the merits of the democratic system. This can be linked to the citizens' perception about their dwindling value as a voter and the lack of control they have over their government's actions. In light of some of these systemic failures in public engagement and legitimacy, there have been attempts, starting in the later part of the 20th century, to develop new and improved models of democracy.

1. Introduction

One of the most popular models to be developed is called *deliberative democracy* and it aims a form of democracy that aims to promote greater legitimacy for collective decisions and to deepen democracy through greater public engagement in political processes. It aims to do so by promoting collaborative reasoning and respectful disagreement among citizens during the decision making process (Gutmann, & Thompson, 2009). However, one of the prevailing criticisms of deliberative democracy is that it is hard to implement. Citizens are not always motivated or capable enough to contribute to a discussion and may instead choose to merely monitor political decisions from the sidelines.

The increasing prevalence of ICTs and the potential of web 2.0 to reduce the threshold for participation have reinvigorated our interest in deliberative projects (Chadwick, 2012). Online deliberation offers some key advantages such as ease of use (Chadwick, 2012), anonymity (Price, 2009), and exchange of ideas that help reduce patterns of social dominance (Price, 2009). Internet technologies also allow for representative deliberation by enabling geographically dispersed and demographically diverse participants to interact with one another for an unlimited time period

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(Cavalier, KIM, & Zaiss, 2009). These observations suggest that the Internet could emerge as an effective medium for facilitating deliberation.

This paper will present a "value-based design" approach to online deliberation, based on theoretical foundations laid out by prominent deliberative democracy theorists. A theory-driven approach to design can lead to design solutions that are beneficial and more successful that seat-of-the-pants approaches(Briggs, 2006). In the next section we present our working definition of deliberative values and a brief overview of existing deliberation platforms.

2. Related Work

In this section, we first provide an overview of recent trends in deliberative theory and introduce key values that contribute to the legitimacy of deliberation processes. Following this, we present a survey of existing approaches to online deliberation and discuss their effectiveness in realising these deliberative values.

2.1. Deliberative Values

The deliberative model of democracy emerged from criticisms about the legitimacy of previous democratic models. The legitimacy of a democratic model is what makes its authority acceptable to the citizenry. Legitimacy is of two types-- *input-legitimacy* and *output-legitimacy*. A political process is said to have input-legitimacy when it reflects the authentic preferences or will of the citizenry. In common parlance, this can be likened to the notion-- "of the people". Deliberative democracy derives its input legitimacy from its focus on procedural fairness and equal opportunity to all deliberators. A political process has output-legitimacy when it can promote the common welfare of the citizenry. This is more commonly captured by the notion-- "for the people". Deliberative democracy derives its output legitimacy from its focus on solving systems in solving real-life problems. Below, we will present our working definitions of salient deliberative values that have been suggested by deliberative theorists to bring greater input and output legitimacy to the democratic process.

2.1.1. Input-Legitimacy

Early work on input-legitimacy can be traced to the 1960's when Habermas proposed his concept of "public sphere", a discursive space that facilitates open, reasoned, and mutually respectful exchange of opinions among citizens (Habermas, 1991). Since then many other normative models of deliberative democracy have emerged, each exploring the space of normative values that are needed for input-legitimacy. From our survey, the two of the most salient of these values are- *Impartial-accessibility* and *Reasonable-discourse.*

Impartial-accessibility refers to the value that deliberation and its outputs should be publicly available to all citizens without partiality (Gutmann, & Thompson, 2009; Fishkin, 1991). This value also requires that the content of deliberation- the arguments and supportive evidence- to be made "comprehensible" to the average citizen (Fishkin, 1991). The crux of this value is to ensure that citizens have an equal chance of participating in political decision making.

Reasonable-discourse refers to value that deliberation between individuals should involve mutual respect and reciprocity. Guttmann & Thompson, have argued that deliberators have to be reasonable in the arguments they make--each justifying their arguments on the basis that any other

fellow deliberator trying to attain fair terms of cooperation cannot reasonably reject them (Gutmann, & Thompson,1996). The moral basis here is that citizens should not be treated as passive subjects to be ruled over, but as independent collaborative agents sharing the role of governance (Fishkin, 1991; Fishkin, & Luskin, 2005; Gutmann et al., 2009).

2.1.2. Output-Legitimacy

While some early theorists viewed deliberative decision making only through the lens of moral values, starting in the 1990s, researchers argued for a more holistic view of deliberation. This view emphasised, the need for increasing output legitimacy by equipping the democratic system with the ability to solve the problems confronted by citizens in their daily life. There are 3 salient values (see Figure 1) that have been proposed by deliberative theorists towards this end -- *Epistemic value, Binding decisions & Dynamicity*.

In his seminal paper Estlund argued that the legitimacy of democratic systems derives from its ability to provide better quality decisions while ensuring procedural fairness among participants (Estlund, 1997; Eslund, 1998). He used the word *epistemic value* to talk about the likely tendency of a decision process to yield good quality decisions.

The second value of *binding decisions*, requires that decisions taken during deliberation have to be binding on the deliberators for a certain agreed period of time (Gutmann et al., 2009). This is to ensure that deliberations are not indefinite and that citizens have to stop discussing at some point in time and proceed to making decisions.

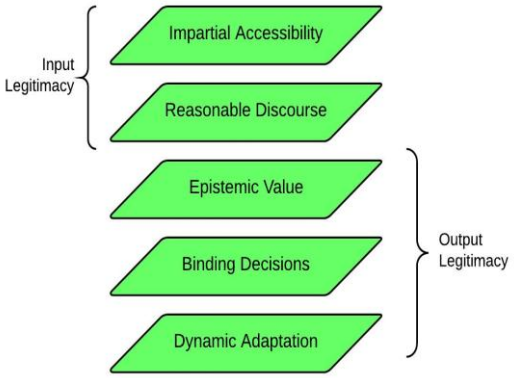

Figure 1: Democratic values categorized by input and output legitimacy

Lastly, *dynamicity* refers to the idea that deliberative decisions are constantly evolving. One way to think about is to view all decisions as provisional and capable of being revised at a future time based on new evidence or reasoning (Gutmann et al., 2009). Our remaining discussion will focus on these deliberative values (Figure 1).

2.2. Current Approaches to Deliberation Design

In this section, we look at various systems that cater to the aforementioned values of deliberative democracy. Some of the systems are not exclusively or purely deliberative in their purpose, but nonetheless contain features that that facilitate deliberative functions.

2.2.1. E-democracy

An interest in e-democracy emerged in early to mid-1990s, as Internet access began to take off in much of the developed democratic world (Macintosh, 2004). E-democracy systems seek to deepen provide asynchronous communication channels and open spaces for citizens to engage in policy deliberation.

Such initiatives fall into three types: *information*, *consultation* and *participation* (Macintosh, 2004). *Information* initiatives typically consist of a "one-way relationship in which the government produces and delivers information to the citizens" (Macintosh, 2004). This could involve email alerts for new policy issues, translation support for ethnic languages, online publication of annual reports, etc. These services fulfil the accessibility criterion of deliberative democracy. *Consultation* is characterised by a two-way relationship in which citizens can also provide feedback to the government. Typical consultation services include online surveys, discussion forums, evidence management systems, etc. Online surveys can be seen as helping to realize the deliberative value of impartial accessibility by ensuring equal voice for the citizens. The third category, namely, *participation*, refers to the highest level of citizen engagement, where the government actively engages with citizens in defining the process and content of policy making (Macintosh, 2004). Here, citizens enjoy greater standing in being able to set the agenda and are seen as pivotal to the decision making process. Online systems like e-petition and e-referenda are perhaps the most popular examples of participation. Such initiatives also include the feature of e-voting, which allows citizens to cast their preferences for different policies through an electronic ballot. This service can be seen facilitate output legitimacy by helping form *binding decisions*.

2.2.2. Argumentation Systems

Argumentation (*reason-giving)* is crucial aspect of deliberation and recently there has been an increased interest in using argumentation support systems in deliberative contexts. As a result the field of "computer supported collaborative argumentation" or CSCA has emerged in the past decade. These research focuses on the pedagogy of argumentation. This refers to teaching users how to create, edit, interpret and review arguments (Scheuer, 2010). CSCA carries out 2 major functions: representing arguments and designing interactions. Argument representation is a crucial aspect of communication between deliberators. The format of representation on a platform not only impacts the production of the arguments, but also influences how the arguments are manipulated and the possible evaluation or analysis of such arguments. The major types of representation formats are *sequential* (linear), *threaded,* and *graph*. The other key affordance of CSC, interaction, refers to the framework available for users to interact with both argument representations and other users. The design also puts a constraint on the level of control or freedom users have over the content of their arguments. These interactions can be completely free without any restrictions or be calibrated. The calibrated interactions can mean prompting users using background materials (e.g., a collection of unresolved issues) or giving tools that help with extracting the essence of the arguments. Perhaps the best known of all argumentation systems is Belvedere, a multiuser, graph-based diagramming tool for scientific argumentation (de los Angeles Constantino-Gonzalez et al, 2003). Belvedere provides basic knowledge units and allows users to formulate the relationship between these units (de los Angeles Constantino et al., 2003; Scheuer, 2010). Another good example is Rationale (Van Gelder, 2003). Rationale allows the user to construct arguments quickly using an argument diagramming system. The system allows for

modification and evaluation of argument visualizations (Van Gelder, 2003). It has become a key tool for teaching reasoning and argumentation skills.

Another type of argumentation system that is similar to CSCA is called *computer supported collaboration scripts* (CSCS). Developed primarily as a collaborative learning tool, it has found application in argument facilitation and knowledge construction in group deliberation settings (Stegmann, Weinberger, & Fischer, 2007). Collaboration scripts refer to instructional plans that specify and sequence learning activities for a user (Stegmann et al., 2007). They help foster learning by shaping the way learners interact with each other. CSCS can help in coordinating the learning process by prompting users to take note of where their peers are in the script sequence and initiate appropriate learning specific activities (Kobbe, Weinberger, Dillenbourg, Harrer, Hämäläinen, Häkkinen, & Fischer,2007). A variant of CSCS called *argumentative computer supported collaborative scripts* (ACSCS) uses argumentation sequences consisting of arguments, counterarguments and integration. ACSCS use assistive tools like prompts and hints to help achieve extended deliberation (Stegmann et al., 2007). ACSCS have been shown to enhance the quality of arguments and facilitate individual acquisition of knowledge (Stegmann et al., 2007). This feature of formalizing arguments is a very crucial feature and is directly aligned with the deliberative criteria of accessibility and reason-giving (Gutmann et al., 2009).

As deliberation platforms become bigger in scale, the amount of information in an argumentation representation can become too overwhelming and lead to a breakdown of deliberation. This is typical of large-scale deliberation environments like blogs and chat rooms. These platforms generate poorly-organized contributions with a high rate of redundancy (Klein, 2012). One promising system that has tried to address this issue is the MIT Deliberatorium (Klein, 2012). By using *deliberation maps*, the system takes care of redundancies (only one unique entry for a unique argument) and tries to get each argument placed next to those that are most logical to be connected to. The deliberatorium makes use of a process consisting of authors (those who make the arguments), moderators, and readers. Authors try to systematically unbundle their arguments, locate the right place for their argument on the deliberation map, and choose to either modify an existing argument or create a new entry. The role of the moderator is to certify well-structured posts. The reader performs a more passive role, by highlighting good arguments in the deliberation map (Klein, 2012).

2.2.3. Deliberative Mini-publics

E-democracy platforms and argumentation systems represent attempts to harness the power of large groups of people. Even with argumentation systems based on small groups, the systems are designed to perform optimally with larger participant involvement. But by the early 1980s, deliberative theorists had started reviewing the effectiveness of such large-scale decision making methods like public polls (Fishkin, 1991). The pursuit of equality or inclusiveness in many ways acted antagonistically to the value of deliberation and led to situations of the "majority tyranny" (Fishkin, 1991). Aggregation methods like public polling failed to take into account aberrations like rational ignorance (cost of educating oneself on an issue exceeds the potential benefit) and non-attitudes (participants giving opinion when they do not actually have one).

To address these limitations, theorists started looking into mini-publics as they were more suited for reflexive engagement. A good example of online mini-publics is the Deliberative Polling project called project PICOLA, modeled on Fishkin's deliberative polls (Fishkin, 1991). It delivers a

multimedia environment designed for online structured dialogue. It consists of an *education phase* where participants can learn about the issue in a online reading room, a *discussion phase* where participants synchronously discuss the issue at hand and prepare questions for a panel of experts and a *reflection phase* where the participants continue the discussion in an asynchronous manner through forums or may choose to take a survey on the topic (Cavalier et al., 2009).

All the platforms discussed so far have their merits. E-democracy platforms make the policy-making process more accessible to ordinary citizens. Argumentation systems not only focus on the epistemic value of generating better arguments, but also facilitate normative goals like reasonable discourse through its moderator support systems. Deliberative mini-publics cater to epistemic value, by showing that smaller online communities can be used to generate good quality representative decisions. However, these approaches are lopsided in their adoption of deliberative value. E-democracy platforms, while useful for government-citizen communication, are not explicitly designed for deliberation among citizens themselves. It is severely limited in its ability to increase output legitimacy. Argumentation systems are yet to be seen to serve the particular purpose of policy deliberation. To summarize, none of the above-mentioned approaches is able to satisfactorily cater to 5 salient deliberative values. We therefore set out to present a comprehensive set of design interventions that can address all deliberative criteria to a satisfactory extent. In order to achieve this, it is very important to clearly operationalize the deliberative criteria in terms of design recommendations.

3. Design Recommendations

In this section we present our design recommendations based on insights from the fields of social psychology, political psychology, media psychology and democratic theory. The following discussion is split into 5 sections corresponding to the 5 key deliberative values (Figure 1). Each section will explicate key challenges in the design for the associated value and will introduce design recommendations aimed at addressing them.

3.1. Designing for Impartial Accessibility

3.1.1. Preparation of Deliberators

Impartial accessibility needs to be guaranteed before, during and after the deliberation process. To make sure that all citizens are given equal opportunities to get involved in the deliberation process, we propose to use *National Random Sampling* instead of self-selection that many e-Democracy or argumentation systems have used to generate our participants. In other words, a random sample of the national population is made to make sure that regardless of demographic varieties, people from all walks of life will be given the opportunity to start deliberation with other citizens. Although this particular design feature is not highly technological, it does provide an impartial starting point for later technological interventions to be meaningful.

Another key phase where accessibility is crucial is at the beginning of the deliberation session when the participants are given the opportunity to learn about the policy issue and the norms of a deliberation process. This debriefing session should be designed so that there is consistent learning among all participants. This may be achieved by making the debriefing process a self-paced interactive learning experience.

Table 1: Shows deliberative values, their associated challenges and the proposed set of design approaches

Deliberative Value	Challenges in Design	Design approaches
Impartial Accessibility	Preparation of Deliberators	Random National Sampling, Self-paced Learning
	De-cluttering Arguments	Enforced Coherence
Reasonable Discourse	Dealing with Escalations	Goal-based Belief Representation
	Unraveling Reciprocity	Bricolage
Epistemic Value	Interactive Reasoning	Dissimilarity-based Random Selection
	Practical Reasoning	Variability based Attention Mediation
Binding decision	Making Robust Decisions	Meta-consensus-based Aggregation
	Fighting Opportunism	Salient Group Identity
Dynamicity	Defining Provisionality	Dynamic Documentation
	Quality of Dynamicity	Accommodative Restructuring

Recent research on self-paced learning platforms like Khan Academy suggested that self-paced learning instills confidence in learners to work independently and enables them to assert more control and ownership over the direction of their learning (Thompson, 2011). We recommend an approach called *Self-paced Learning* to help the individuals personalize their learning experience. This approach can be deployed for both learning about the "issue" being deliberated on and learning about the functioning of any interface tool used for deliberation. This is crucial because equal participation is harder to achieve without a reasonable equality in the deliberator's skill levels at operating the interface. To incentivize the learning process, we include a feature based on reputation points. The use of social-currency based incentives, such as reputation points, may lead to an online hierarchy that impedes equal participation we are hoping for (Rosenberg, 2005). To avoid this, we recommend that details about each participant's status to be kept private and available only to the said participant through the individual interface. The participant will be able to assess if their own performance is in keeping with that of other but will not be able to directly know the reputation points of someone they are deliberating with. We call this revised mechanism *self-reputation points*. Last but not least, impartial accessibility to the decision making phase needs to be operated meaning that all crucial information (except internally generated data) pertaining to a deliberative session, have to be made equally accessible to all participating deliberators.

3.1.2. De-cluttering Arguments

One of the problems with online deliberation is the clutter it generates when large groups engage in argumentation. It is typical for these deliberation spaces to have duplicate entries of the same argument. Another problem is that of argumentation becomes unsystematic over time and leads to a messy collection of ideas that is hard to understand. Since comprehensibility is a requisite to *impartial accessibility,* it is important that we tackle this issue. In order to address this we recommend an approach called *Enforced Coherence* consisting of two components- *reducing duplication & conscious structuring*.

1. *Reducing duplication*- This refers to a mechanism that limits the number of possible duplications of the argument. One way to do this is to moderate the argument making process through a filtering process which checks for duplications. An example of such a system is the MIT Deliberatorium (Klein, 2012).
2. *Conscious structuring*- This component tries to constraint the type of argumentation that is possible in a deliberation session. We base this feature on the observation that in a deliberative setting, arguments are usually made with the intent to influence policy making. We therefore recommend that the furnishing of arguments be restricted to only those spaces (forums, chat rooms etc) where it is relevant to policy making. One way to think about it is that the mode of entering an argument is required to choose the policy first before argumentation. For example, to make the argument that "green houses gases cause rise in atmospheric temperature", the deliberator will have to access, a policy like "Reduce CO2 emissions" to be able to do so.

The *Enforced Coherence* approach seeks to force deliberators to avoid duplication and argue in a manner that is mindful of the context (the policy) in which the argumentation is taking place. In summary we recommend 3 approaches. *National Random Sampling, Self-Paced Learning & Enforced Coherence* to help address the challenges involved with *impartial accessibility*(see Table 1).

3.2. Designing for Reasonable Discourse

3.2.1. Dealing with Escalations

Reasonable discourse requires deliberators to be conscientious and comprehensive in how they engage with the arguments of other deliberators. Sometimes argumentation can lead to talk-over-head where the deliberators continue to have a argumentation without any improvement in their understanding of the opponents views. Such scenarios typically spiral into ad hominem or red-herring attacks. The incidence talk-over-head can be attributed to cognitive dissonance. Studies on group decision making have shown that people have an inner need to harmonize their beliefs and they strive to avoid inconsistencies. Cognitive dissonance refers to the negative feeling that is associated with holding/experiencing two conflicting beliefs (Festinger, 1957; Matz, & Wood, 2005). Cognitive dissonance can operate across people who have incongruent beliefs. We shall refer to this as inter-deliberator dissonance.

In order to mitigate the discomfort caused by inter-deliberator dissonance, we propose a discourse support approach called *Goal-based Belief Representation System (GBRS)*. The design is based on the finding that inter-deliberator dissonance may be brought about by issues with belief selection (Boella,da Costa, Pigozzi, & Tettamanzi, 2010). More precisely, an individual's selection of beliefs from a set of alternatives depends on the inherent goals connected to the individual(Boella et al, 2010). For instance, if a person holds beliefs B1 and B2 and has connected goals G1 and G2 (G1 preferred to G2), then whichever belief that facilitates G1 the best is more likely to be selected. This finding also means that in a deliberative setting, overt expression about one's goals can help reduce the amount of ambiguity or dissonance in the discourse. To illustrate the point, consider a debate between a creationist and an evolutionist on the question of "teaching creationism is schools". Most of these discussions typically result in lot of "cross-talk" and vitriol. The inter-personal dissonance here may be a result of mismatching goals. That is to say that the two beliefs (one from each deliberator) are incompatible because of the fact that the individuals don't share the same set of goals (or not with the same priority). It may be possible to reduce the level of dissonance by divulging more about their motives and desires in relation to their

disagreement. A creationist's motive might be to "restore the moral authority of the Bible" and may find the theory of evolution as a threat to this goal. An evolutionist may have the goal-- "retain scientific theories with good explanatory power" and may reject creationism for this reason. So on the issue of teaching creationism in schools, the dissonance between the two deliberators may be resolved, to some extent, by being explicit about their goals and desires. This dissonance reduction may encourage deliberators to seek common ground. Building on this idea, we recommend that the argumentation discourse should be supported through a mechanism which allows deliberators to represent their goals concurrently with their arguments. As an example, this mechanism take the form of argumentation scripts like "sentence openers" to illicit specific types of argumentation in response to dissonance. For example, sentence openers like "In order to..." or "In furtherance of..." can help deliberators convey their goals concurrently with their arguments.

3.2.2. Unraveling Reciprocity

The value of reasonable discourse requires that deliberators seek agreement through the use of principles and arguments that can be justified to other fellow deliberators. Deliberative theorists call this feature "the principle of reciprocity". However, this principle does not say what would constitute a principle or argument that others would find agreeable. In other words, the deliberators are expected to find these principles (barring few exceptions) mostly through trial and error. We recommend a design approach called *Bricolage* that can help deliberators in this trial and error process. The approach consists of 2 components- *deontic reason support & theory-of-mind facilitation.*

1. Deontic reason support-. The trial and error or reciprocity is guided by the 5 deliberative values, but there will be points of departure, where deliberators will need to reason with each other on what constitutes permissible actions or arguments. This type of reasoning on whether actions are forbidden or allowed, obligatory or non-obligatory etc, is called deontic reasoning. This component will seek to provide support for deontic reasoning by using a database of deontic considerations and combination rules. To illustrate how this can happen, consider 2 deliberators A and B. Person A is contesting a claim that B believes in. Person B believes in the claim because of what B read in the newspapers. Person A would like to convince B that this type of evidence is inadmissible. To do so, Person A can try to use a combination of deontic considerations like - "don't use anecdotal evidence" and "don't use non-peer reviewed research material", to argue that this is inadmissible. Likewise, person B can use other deontic considerations like "don't expect unreasonable degree of effort from an opponent" to argue that, person A should not expect B to provide better quality evidence when it is harder to find. This scenario is particularly plausible, if the claim involved is not a well studied phenomenon.
2. Theory-of-mind facilitation:- This component helps deliberators form a mental picture of what the other deliberator is likely to object to. We recommend the use of "personas" or "short blurb" that that a deliberator can use to describe likes and dislikes with respect to a particular topic or mode of argumentation. For instance, an individual may describe themselves as a "climate change activist". This would help other deliberators in deciding what they can expect from the other person at the time of argumentation.

The Bricolage approach will seek to help deliberators argue with greater reciprocity and mutual respect. To summarize, in this sub-section, we have introduced 2 approaches *GBRS* and *Bricolage* to facilitate the value of reasonable discourse.

3.3. Designing for Epistemic Value

3.3.1. Interactive Reasoning

Although current deliberative platforms cater to substantive ideals of deliberation like equal representation and belief coherence, there is very little, by way of design features, for ensuring epistemic standard in deliberation outputs. One possible reason for this is that the epistemic value of a conclusion is harder to evaluate with certainty in comparison to normative values (Gutmann et al., 2009; Mercier et al.,2012). Another reason could be that people may always disagree with each other for rational reasons, especially on issues of religious, philosophical and moral nature--often referred to as "the burden of judgements" (Rawls, 2001).

Traditionally, the role of reasoning has been thought of as helping the formation of "true" beliefs about the world. According to this view, reasoning is a form of conceptual inference, which helps an individual improve his/her mental representations about the world. But the near ubiquitous prevalence of fallacies and biases of reasoning have led researchers to question the true function of reasoning in human cognition and decision making (Mercier, & Landemore, 2012). Of particular relevance is the role of *confirmation bias*, which is perhaps one of the most well-established and robust cognitive biases((Mercier et al.,2012; Nickerson, 1998). It refers to a less explicit, less conscious form of "case building" that people engage in order to defend or confirm their beliefs or hypotheses (Nickerson, 1998). Some research in evolutionary psychology and cognitive science has tried to revisit our understanding of cognitive biases by looking at the possible evolutionary benefits they acrue. Confirmation biases, according to this view, are not an anomaly of reasoning but the very essence of it. Of particular interest is a new theory called the *argumentative theory of reasoning* which posits the role of reasoning a tool to facilitate and coordinate social interactions (Mercier et al., 2012). More precisely, the proposed function of reasoning is to produce improvements in our thinking by helping us find and evaluate arguments within a deliberative context (Mercier, & Sperber, 2011; Mercier et al.,2012). Note that reasoning is no longer considered to be an "individualistic" exercise, but the outcome of the social process of argumentation and refutation. The individual reasoner is seen as conservative with respect to his/her own beliefs. Accordingly, reasoning involves defending one's beliefs/hypotheses by bolstering those mental representations that can increase their plausibility and rebutting other beliefs/hypotheses by undermining those representations that can decrease their plausibility. The argumentative theory of reasoning does not claim that reasoning in its biased form is epistimically better, but merely that individual reasoning is by nature "biased" and that any attempts to improve it has to include an interactive element (Mercier et al.,2011). For instance, confirmation bias, which is detrimental in an individual reasoning condition, can have beneficial effects in argumentation situations between people who disagree. One such benefit is division of labor: when people reason in groups, it is more efficient for each individual to look more closely at the arguments they support. The purpose of reasoning is thus to facilitate social interaction and help individuals manage their beliefs more efficiently with new ideas that emerge from this interaction.

To facilitate this type of interactive reasoning we recommend that groups of individuals participating in deliberation be selected based on the extent of dissimilarity between them. We call this approach *Dissimilarity-based Sample Selection (DBSS).* It consists of 2 key steps:-

1. *Policy Preference Ranking*- The participants in a deliberation session are asked to rank their preferences from a standard list of policy alternatives for a given issue. This list of will be reasonably comprehensive and diverse.

2. *Proximity-based group selection* - The preference ranking is used to calculate the dissimilarity between individuals. A popular metric is called *proximity measure,* which evaluates the level of agreement between an individual's ranked preference and that of a entire pool of deliberators in the session (Herrera-Viedma, Herrera, & Chiclana,2002). The measure has a inverse relationship with dissimilarity. More the proximity lesser the dissimilarity. The big pool of deliberators is then split into groups that are more appropriately sized, all the while ensuring that the proximity measure of each individual with respect to their assigned group attains its least value(maximum dissimilarity)

This approach is to be deployed at the beginning stages of a deliberative session, so as to maximize the quality of interactive reasoning.

3.3.2. Practical Reasoning

An important limitation of current platforms is that they typically assume deliberation to mean theoretical reasoning (i.e., reasoning about ends). This view excludes other forms of reasoning like practical reasoning (i.e., reasoning about means). While theoretical reason is concerned the setting of goals that are accessible and justifiable to everyone, practical reason, deals with the organization and deployment of means to achieve these goals. It is more about strategy building and facilitating "implementable" plans. But, sometimes, goals are a priori justifiable, like the goals set by planning or research organizations. A goal like "find a cure for cancers by the end of the decade" may ultimately be hard to realize, but the challenge here is not to reduce our expectations but to develop alternative strategies that can make it easier to achieve the goal. This requires a combination of practical reasoning and ideation. In order to incorporate this type of practical reasoning into deliberation, we propose a 4-component approach to collaborative strategy building called *Viability-based Attention Mediation* or VAM.

This approach consists of three basic components - 1) *framing*, 2) *viability assignment* and 3) *influencer generation*. 4) *Attention Mediation*

1. *Framing*- This refers to the process through which a problem scenario is converted into a goal. For instance, imagine a community facing acute water shortage in their locale. Different stakeholders of the problem may view the problems in different ways- some may view it as a water supply issue stemming from reduced rainfall and others may view it as a mismanagement issue stemming from the incompetence of local government officials. The resulting goals can be distinctly different, e.g. "find alternate water source" and "fire negligent officials".
2. *Viability Assignment*- Each such goal will be associated with a unique *viability* score that decreases with increased difficulty of achieving that goal. Using the example above, a goal like "fire negligent officials" may have a *viability assignment* higher than the goal "find alternative water source", since it seems more achievable. Seen from a collaboration perspective, viability assignment can be thought of as score established through the aggregation of individual scores from each deliberator. It is important to note that the viability assignment of a particular goal is dependent on the particular strategy associated with a goal. A better strategy can change the perceived viability of a goal. In this connection, the next component has a vital role to play.
3. *Influencer Generation*: Influencer refers to a specific type of subset of the context within which any problem exists. The context for the "water shortage problem" can include elements like- the location of the community, their demographic spread, their average disposable income, awareness in the community etc. The influencer refers to those elements of the context that

when modified can "influence" the viability of the associated goal. For instance, the context element "average disposable income" is an influencer because it can increase the viability of the goal "find alternate water source"(it will be possible to privately procure water with more disposable income). On the other hand, the context element "demographic spread" may not be very relevant to either of the two goals. Hence, it may not qualify as an "influencer". The component of *Influencer generation* refers to a process of generating context elements for a certain goal that can function as influencers for that goal. The VAM approach, consists of running the 3 components of framing, viability assignment & influencer generation in sequence and iterating this process in a nested or recursive manner. The recursive property requires that the input and output of the sequence be matched. We like to note that, influencers are semantically similar to problem scenarios (what see *framing)* in their syntactic and semantic make up. Each goal generated from framing can be thought of as populating a nested decision tree.

4. *Attention Mediation:* This component facilitates the "collaborative" aspect of VAM. To collaboratively build an implementable strategy, it is crucial to be able to divert the deliberator's attention to those goals that are low on viability. This way the component helps multiple individuals to strategize together.

In summary, two approaches namely, DBSS and VAM are recommended to increase the epistemic value of the deliberative process.

3.4. Designing for Binding Decisions

3.4.1. Making Robust Decisions

In deliberative theory, decision making is understood in multiple ways. While aggregation tools like voting are popular, it is a less inclusive decision-making mechanism and brings into question the legitimacy of binding decisions. Calling for a vote at the end of a deliberation session is also seen as an abrupt transition from deliberative practices like that creates discontinuity to the deliberation session (de los Angeles Constantino-Gonzalez, Suthers, & de los Santos, 2003). Gutmann & Thompson have argued that the focus of deliberation should not be to implement consensus but to allow people to discover common ground while disagreeing respectfully with others (Gutmann et al., 2009). Even though current offline deliberation systems like Fishkin's deliberative polls and consensus conferences have shown promising results, they do not cater to consensus-building explicitly (Fishkin, 1991). Part of the reason might be that from a proceduralist perspective, consensus is not always the goal or outcome of deliberation (Gutmann et al., 2009; Zhang & Chang, 2014). Some deliberative theorists instead choose to focus on other outcomes like preference transformations (Fishkin, Rosell, Shepherd, & Amsler, 2004). Consensus as defined by current deliberation platforms typically means unanimous agreement which is hard to achieve. Moreover, deliberative theorists have demonstrated that decision rules can never be completely based on consensus. A consensus process requires that we grant the right of consent (in other words the power to veto) to every participating member. However, in a political context the decision making process is expected to be robust- must result in some outcome (Rae, 1975). A consensus-based system cannot be robust if we consider its wider political context.

Some recent work has offered an alternative concept to pure consensus called *meta-consensus*. Meta-consensus seeks to generate agreement about the nature of the issue at hand. An agreement on outcome is unnecessary (de los Angeles Constantino et al., 2003). Meta-consensus can happen

at the level of values, beliefs or expressed goals. This ensures that when individuals agree/disagree on a decision, they also agree/disagree on the reasons behind it.

Even though meta-consensus may help us avoid the challenge of getting full consent, it is still not entirely robust (Rae, 1975), because it is important that a collective political decision scales down to the level of an implementable decision. This implies that aggregation mechanisms are still required to end the deliberation session. By combining meta-consensus with aggregation methods we can achieve a decision process that is more epistemically valid. We call this approach *Meta-consensus-based Aggregation* (*MCBA).*

3.4.2. Fighting Opportunism

Another obstacle to binding decisions is the contradictory roles of dissent and consensus. During deliberation, individuals are encouraged to express dissent, but at the time of decision making, they are expected to commit to a decision. This switch to a different mode of engagement with fellow deliberators can be wrought with confusion and anxiety. One such anxiety is the fear that fellow deliberators may behave opportunistically and hijack the decision process for their own personal benefits. It has been shown that this can interfere with the communication and information processing with a deliberating group (Dooley, & Fryxell,1999). One way to tackle this problem is to build loyalty among deliberators. Loyalty facilitates a constructive processing of dissenting opinions by promoting open communication and sharing of information (Dooley et al.,1999). Increased loyalty can help dampen these anxieties and facilitate the formation of binding decisions. One of the factors that can increase loyalty is "group identity"(Van Vugt, & Hart, 2004). When people identify with a group, their welfare becomes increasingly intertwined with the welfare of the group. Two key factors that encourage the formation of group identities are visual anonymity and "collectivized" environments (Van Vugt et al.,2004). Visual anonymity implies that visual cues like a profile picture that are likely to give away the identity of a person are kept hidden. Collectivized environments refer to the look and feel of the spaces where the groups carry out their tasks. Collectivization is this sense is akin to "personalization", except that the salient identity being projected is at the level of the group and not the individual. We recommend an approach that we call *Salient Group Identity (SGS)* which can increase the likelihood of binding decisions by using the features like visual anonymity and collectivized environments.

In summary, two approaches, namely, *MCBA* and *SGS*, are recommended to better facilitate binding decisions among deliberators.

3.5. Designing for Dynamicity

3.5.1. Defining Provisionality

Dynamicity of a deliberative decision refers to its tentative quality. Most deliberative platforms tend to overlook this concept or treat it as a mere "philosophical stance of doubt" one retains about the outcome of deliberation. We operationalise this concept to mean that deliberative outcomes are amenable to re-examination. This amenability is similar in spirit to the "principle of parsimony" from the philosophy of science. In the case of scientific experiments, the documentation of the details like demographic spread of participants or the theoretical framework used to interpret the data are crucial. Without this information, it would be harder for any reader or reviewer to re-examine the validity of its conclusions. In a similar vein, we argue that deliberative decisions become more amenable to re-examination when there is sufficient documentation of the

assumptions and pragmatic decisions that go into decision making process. We call this approach *Dynamic Documentation.*

3.5.2. Quality of Dynamicity

The value of dynamicity can be seen as opposed to that of binding decisions in some ways. The former is about re-examining decisions while the latter is about committing to it. If a large number of decisions are re-examined simultaneously, the deliberative process may get chaotic and lose direction. It is therefore imperative that deliberators choose to limit their disagreements by what Guttmann calls "the principle of economy of moral disagreement"(Gutmann et al., 2009). This principle states that citizens should try to minimize their disagreement with their opponents so that they can continue to work together and find common ground. Reaching such common ground, reduces the risk of chaos and opens up the space for continued and more effective re-examining of decisions. Another way to think about common ground is through the lens of conflict resolution. Work done on cooperative design systems has shed some light on types of conflicts, namely, domain-level conflict and control level conflict that are relevant to our discussion (Klein, 1991). For our purposes, domain-level conflict refers to disagreements regarding the form or content of the arguments, whereas control-level conflicts are concerned with conflicting recommendations about the direction a deliberative process should take to address the issue. We can see that, the "common ground" is more directly linked to control-level conflicts than domain-level conflicts; the former requires a strategy to move forward whereas the latter requires consensus or agreement to move forward. We recommend a control-level conflict resolution approach called *Accommodative Restructuring* that has following components- *Argument orientation & conflict support.* Argument orientation allows deliberators to indicate their preference on how to proceed with an argument, based on a list of choices. For example, deliberators might choose to "pursue an argument at a later time" or chose to "take it up immediately". This component facilitates the expression of control-level recommendation among deliberators. The second component, *conflict support*, refers to a database of suggested strategies that the deliberator can use to diffuse their disagreement. For example, consider two people A and B deliberating on climate change. Person A disagrees with B on whether climate change is man-made, the former being of the opinion that it isn't. The conflict support component can help when deliberation reaches an impasse and becomes unmanageable. The component consists of a database of control-level strategy templates that the deliberators can use to create their own conflict resolution strategies. Using the above example, Person A may use a template strategy like "re-order argument priority", to suggest to Person B that they temporarily stop a particular argument and give more priority to other aspects the issue. Thus this approach can be used to restructure the direction and nature of deliberation so that disagreements remain manageable.

In summary, in this subsection we recommend the approaches of *Dynamic Documentation* and *Accommodative Restructuring* to better cater to the deliberative value of dynamicity.

4. Conclusion

In conclusion, we have presented a 11-part value-based design approach (see Table 1) which we believe will help in enhancing the legitimacy of online deliberation. Since the paper only gives a meta-level description of design recommendation, we hope that it will be useful in instigating further research and discussion especially with regards to implementing these approaches. While

we have tried to mindful in the crafting of our theory-driven approach to design, the challenges we raise are by no means exhaustive and this domain is certainly fertile for more design ideas. We hope that both HCI scholars and deliberation practitioners will find this paper useful as a comprehensive guide to their research on online deliberation.

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