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Running Head: GROUP DISCUSSION

The Group Discussion Effect: Integrative Processes and
Suggestions for Implementation

Rose Meleady, Tim Hopthrow & Richard J. Crisp
Centre for the Study of Group Processes, University of Kent

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Correspondence concerning this article should be addressed to Rose Meleady, Centre for the Study of Group Processes, School of Psychology, Keynes College, University of Kent, CT2 7NP, UK. E-mail: rm379@kent.ac.uk

Abstract

One of the most consistent findings in experimental social dilemmas research is the positive effect group discussion has on cooperative behavior. At a time when cooperation and consensus is critical to tackle global problems, ranging from debt to deforestation, understanding the dynamics of group discussion is a pressing need. Unfortunately, research investigating both the underlying processes and implementation of the effect has slowed. We present a critical review of existing explanations and integrate these perspectives into a single process model of group discussion, providing a more complete theoretical picture of how interrelated factors combine to facilitate discussion-induced cooperation. On the basis of this theoretical analysis, we consider complimentary approaches to the indirect and feasible implementation of group discussion. We argue that such strategies may overcome the barriers to direct discussion observed across a range of groups and organizations.

The Group Discussion Effect: Integrative Processes and Suggestions for Implementation

One of the most challenging tasks facing our society is the enabling of balanced and equitable distribution of limited natural resources. At the heart of these problems lies a distinctly social psychological process: non-cooperation. Examples of how non-cooperation can exacerbate, or even cause, resource depletion are easy to find. England is currently facing its worst droughts in more 30 years. In attempt to reduce the strain on water reserves Thames Water recently launched a river awareness campaign. A representative for the company stated that the aim of the campaign is to communicate to users that “we’re all in this together, we need everyone to value water and use a little bit less” (BBC News, 2011). This plea was an attempt to avoid a crisis that would be almost entirely social in origin: failing to conserve water *would* create a shortage. Such dilemmas represent truly psychological phenomena, resting upon the potential for groups – sometimes on an incredibly wide scale – to cooperate and reach consensus in a way that ensures mutual interest and sustainable existence. This article is about these dilemmas, and how establishing integrated, process-orientated theoretical frameworks may help fashion new perspectives and new solutions to the dilemmas we, as societies, face.

The Social Dilemma

Hardin’s (1968) famous parable of the “Tragedy of the Commons” provides a classic illustration of the social dynamics underlying environmental dilemmas. Hardin describes a communal pasture upon which local herdsman are permitted to graze cattle for free. In this situation it is individually rational for herdsman to increase their herd, and consequently, their profit. However, if everyone reasons accordingly, the pursuit of self-interest will lead to collective disaster as the pasture become overgrazed and all cattle are lost. This situation can be conceptualized as a ‘social dilemma’. Social dilemmas occur when individuals must

decide between behavior that benefits the self and behavior that benefits the collective. The dilemma arises because individuals are always better off when they choose the *personally rewarding*, non-cooperative choice. Yet, if all individuals defect everyone will end up worse off than if they all choose the *collectively rational*, cooperative choice (Dawes, 1980).

Almost daily it seems scientists' prognosis of the state of the planet becomes increasingly dire. As our knowledge of the scale of environmental challenges grows, we must consider the inadequacy of the current approaches to these challenges. It is crucial for experimental social dilemmas research to find means to reinforce individual restraint within these environmental challenges, as well as other pressing societal problems which have the characteristics of a social dilemma including, issues of population growth, overfishing, the provision of public services, contribution to local neighbourhood watch schemes, and elimination of the budget deficit.

One of the most promising findings amongst this research is that individual group members are more likely to act cooperatively if they are first given the chance to discuss the dilemma with one another. In fact, a meta-analysis of 35 years of social dilemmas research concluded that communication was the strongest and most reliable predictor of cooperative behavior (Sally, 1995). Explaining this effect has, however, been a challenge. Several competing explanations regarding the psychological mechanisms underlying the communication effect have been the subject of theoretical debate. Moreover, despite the strength of the group discussion effect, coupled with its significant potential to increase social harmony, research surrounding the effect has been less impactful than hoped.

Reinforcing these concerns, a number of critical reviews have raised some serious doubts about both the theoretical basis and the external validity of experimental social dilemmas research. Komorita and Parks (1995), for instance, condemned existing theoretical

models as “superficial”, failing to specify how interrelated factors combine to facilitate cooperation, while Pruitt and Kimmel (1977) noted a reluctance to extrapolate findings from the laboratory to real-life. In light of these concerns Komorita and Parks (1995) urge researchers to become more “process-orientated”, pulling together results to provide a more complete theoretical picture of how cooperation evolves. Pruitt and Kimmel similarly formulated a prescription for future social dilemmas research to address “theory building within a context of a concern about real-life applications” (p. 370).

While contemporary research has shown some progress towards increasing the conceptual scope and ecological validity of some constructs within social dilemmas research (e.g. Joireman et al., 2001; Tyler & DeGoey, 1995; Van Vugt, 2001), such improvements have not been apparent within the group discussion paradigm. Research has stalled in a state of disagreement regarding the processes underlying the communication effect, whilst applications have been discouraged by the realisation that discussion amongst all decision makers is often difficult to establish (Samuelson & Watrous-Rodriguez, 2009).

With the aim of bringing the field more in line with prescriptions, we present an integrated process model of the group discussion effect. Employing models of group development as a corroborating framework, we argue that discussion groups faced with a social dilemma routinely pass through four stages of *orientation*, *conflict*, *consensus* and *group decision* (see Figure 1). Aspects of previously competing explanations are described to provide incremental contributions toward discussion-induced cooperation in an additive fashion. We hope that providing this comprehensive, encompassing theory will provide a framework from which effective applications can be derived.

Overview

First, we present an overview of the group discussion effect and introduce the competing explanations for the effect. In Part 2 we provide a narrative roadmap for our process model of group discussion in the form of classic models of group development. In Part 3 we argue that the available evidence points to the conclusion that multiple processes operate simultaneously to enhance cooperation within group discussions and incorporate these previously competing explanations into an encompassing process model of group discussion. Finally, in Part 4 we consider the implications of this model. We justify the additive nature of our model and detail how this framework can guide future exploration. Finally we consider the pragmatic problems of face-to-face discussion and argue that one solution is the use of *indirect* discussion-based strategies, grounded by our integrated theoretical model.

I. The Group Discussion Effect

A number of solutions to increase cooperative behavior within social dilemmas have been empirically advanced. Some of the most established solutions include the conversion of public goods into privately owned resources (e.g. Messick & McClelland, 1983) appointing an agent who has authority over the provision of a common resource (e.g. Samuelson & Messick, 1995), supplementing incentives for cooperation (Wit & Wilke, 1990) and likewise imposing sanctions for defection (e.g. Caldwell, 1976; Kerr, 1999; Kerr et al., 2006; Wit & Wilke, 1990). Among solutions most conducive to cooperation, however, is *group discussion*.

In the earliest investigation of the effectiveness of group discussion, Deutsch (1958) found that participants cooperated on 71% of trials of a prisoner's dilemma game when they could communicate with their partner, compared to only a 36% cooperation rate on trials where communication was prohibited. Since this seminal work ample research has confirmed

the strength and reliability of the group discussion effect. In fact, a meta-analysis reviewing 35 years of social dilemmas research concluded that task-related communication was the strongest and most reliable predictor of cooperative behavior, relative to other variables known to influence cooperation (including group size, group identification and the size of the reward for defection; Sally, 1995).

From a rational economic perspective, this finding is anomalous; group discussion does not alter the objective incentive structure of the dilemma, and thus should not be expected to influence individuals' behavior. Psychological research has, however, established that the group discussion effect represents a reliable manifestation of group process. The facilitating effect of discussion has been shown to prevail across manipulations, including pre-game discussion (e.g. Dawes, McTavish & Shaklee, 1977), pre-trial discussion within multi-trial games (e.g. Kerr, Garst, Lewandowski & Harris, 1997) and continuous discussion (e.g. Isaac & Walker, 1988), as well as across task variants including prisoners' dilemmas (e.g. Braver & Barnett, 1976; Voissem & Sistrunk, 1971), public goods dilemma (e.g. Kerr & Kaufman-Gilliand, 1994; Orbell, van de Kragt & Dawes, 1988), and resource dilemmas (e.g. Brechner, 1977; Liebrand, 1984).

However, while it is beyond empirical dispute that group discussion facilitates cooperative behavior, there is less consensus regarding *why*, i.e. what are the psychological mechanisms underlying this effect. We identify three principle explanations amongst the literature: 1. *group identity*, 2. *perceived consensus*, and 3. *group problem-solving*. The group identity perspective suggests that discussion creates a common bond among members and bolsters group identity. This enhanced group identity is presumed to increase concern for group-level, rather than individual-level outcomes, thus increasing the likelihood of the cooperative choice (e.g. Dawes et al., 1977; Dawes, Orbell & van de Kragt, 1990). The perceived consensus approach, on the other hand, suggests that discussion facilitates

cooperation by offering group members the opportunity to develop and become committed to a majority-based group consensus to cooperate (e.g. Bouas & Komorita, 1996; Kerr & Kaufman-Gilliland, 1994). The group problem-solving approach, conversely argues that only a minority of active advocates of the cooperative choice is required to carry the group to a cooperative decision within discussions (Hopthrow & Abrams, 2010; Hopthrow & Hulbert, 2005).

While several authors have previously acknowledged the conclusion that one or more process may operate simultaneously to enhance cooperation (e.g. Chen, 1996; Samuelson & Watrous-Rodriguez, 2009), this review is the first to substantiate this approach. We propose that discussion groups progress in a unitary sequence through a series of stages within which multiple psychological mechanisms *additively* contribute to the fulfilment of a group goal. We now present an overview of linear models of group development to provide a narrative roadmap for the sequence defined within our model.

II. Roadmap: Models of Group Development

One of the most frequently cited models of group development is that of Tuckman (1965). Based upon a meta-analysis of research examining interaction patterns amongst groups, Tuckman's model describes four stages through which both task and social groups are said to progress over time - *forming*, *storming*, *norming* and *performing*.

According to Tuckman (1965), the first stage of group development, as the group comes together as a definite object for the first time, is focused upon group members gaining an understanding of the task at hand. The group is said to synthesise information with the aim of establishing the task parameters and the resources required for task accomplishment.

Tuckman describes *forming* as a fairly comfortable phase of group development within which

an identity as group members begins to emerge as a result of information sharing and agreement on a common view of the task.

Once group members have begun to build a rapport and feel more secure, Tuckman (1965) suggests that groups enter a stage of *storming* in which ideas as to the best ways to progress with the task at hand compete for ascendancy. This is said to represent a relatively uncomfortable phase characterized by conflict as group members compete for roles and try to assert their own personal preferences about how the task should be solved. Clarity of purpose is said to improve within this stage, but plenty of uncertainties still persist.

Gradually groups progress into a more harmonious *norming* stage. Within this stage, group members are said to develop mutual clarity with respect to the task at hand and establish either explicit or implicit rules about how they will achieve their goal as a group. Members are said to develop their own set of norms through this consensus, which they subsequently try to abide by. During this phase, group members begin to accept the vital contribution of others as some group members must abandon their initial opinions and agree with others for the group to function successfully.

Finally, Tuckman (1965) suggests that groups reach a stage of *performing*. The energy of the group is channelled as members make constructive attempts towards task accomplishment. Members can be highly autonomous within this stage, but possess a shared vision and know clearly why and what they are doing without re-examining the full range of alternatives originally considered by the group.

The structure of Tuckman's (1965) model is also mirrored within other models of group development and group decision-making, including that of Bales and Strodtbeck (1951) Fisher (1970) Woodcock (1979) and Wheelan (1990). Although these phase models differ from one another in emphasis, there is a basis agreement that groups evolve through a

pattern of lack of clarity, to conflict, to a stage of agreement and norm formation prior to the achievement of group goals. We do not employ Tuckman's model as a theoretical basis for our model, nor suggest that such models represent a valid description of the group discussion effect within social dilemmas. We do, however, perceive the sequence characterizing models of group development to provide a roadmap for the sequence in which we suggest distinct multiple mechanisms contribute towards discussion-induced cooperation.

III. The Process Model of Group Discussion

While there is little agreement regarding the mechanisms underlying the group discussion effect, authors are in agreement that greater clarity is necessary to advance the development of more effective discussion-based interventions for real-world dilemmas (Kopelman, Weber & Messick, 2002; Orbell, van de Kragt & Dawes, 1991; Samuelson & Watrous-Rodriguez, 2009). Two distinct camps exist amongst scholars in regard to how this aim should be achieved. The first perspective argues that the objective should be towards separating the effects of divergent accounts (e.g. Orbell et al., 1991) While the contrasting approach favors an inadequately explored argument that different mechanisms work more interactively towards facilitating cooperation (e.g. Samuelson & Watrous-Rodriguez, 2009).

Our integrative approach aims to draw a line under competitive tests which have now led to a standstill within the field, and argue that previous research leads to the conclusion that rather than representing mutually exclusive explanations, aspects of each of the existing 'single-cause' explanations can be synthesized into an encompassing process model within four stages of *orientation*, *conflict*, *consensus* and *group decision*. We do not perceive any of these stages, on their own, to be sufficient to enable the robust communication effect that is routinely observed. Rather, each stage is said to form a necessary element of a sequence

enabling an incrementally more powerful effect. We now outline the contributions of each stage in turn.

Orientation

We posit that within the first stage of discussion group members attempt to achieve a common understanding of the task at hand. When groups are first presented with a dilemma, the incentive structure and precise nature of interdependence between group members is likely to be unclear. Early task-related discussion serves to clarify this complexity and reveal the underlying dilemma embedded within the task. As a consequence of this initial discussion, we suggest self-perception begins to transform from the individual-level *towards* the group-level.

The group identity explanation of the communication effect is founded upon classic studies within the minimal group paradigm that have repeatedly demonstrated the powerful influence of ad-hoc in-group vs. out-group categorisations on individuals' allocation decisions (Tajfel & Turner, 1979; Turner, 1975). According to Dawes and colleagues, a period of task-related group discussion serves to make common category membership salient and represents a far more substantial manipulation than minimal group distinctions (e.g. Dawes et al., 1977; Dawes et al., 1990). Accordingly, group discussion is expected to create a common bond amongst members and bolster group members' identification with their group. Such identification is presumed to increase concern for group-level, rather than individual-level outcomes, thus increasing the likelihood of the cooperative choice.

Cited as evidence for this approach Dawes et al. (1977) compared the effectiveness of four communication conditions on cooperative behavior 1) a no communication, control condition, 2) task-irrelevant group discussion, 3) task-relevant group discussion and 4) task-relevant discussion followed by a non-binding declaration of intended choices. Results

demonstrated that cooperation rates were low in the control and task-irrelevant discussion conditions (27% & 35% respectively), but were significantly increased in the task-relevant discussion groups (74% & 84%). The difference in cooperation rates between these latter conditions was not significant. The authors interpreted the difference between task-irrelevant and task-relevant communication as evidence for the group identity explanation, arguing that unless the dilemma is discussed, bolstered identification with the group will not occur. In this case, any cooperative behavior is motivated by egoistic concerns of external gain. In the presence of task-relevant discussion, however, bolstered identification explains the dramatic increase in cooperation.

We do not however, uncritically accept Dawes' and colleagues (1977) ad-hoc argument here. It is not clear, why if, as the minimal group paradigm shows, categorisation is sufficient to create a social identity and subsequent in-group biases, would discussion of the dilemma per se would be needed. Thus, while Dawes and colleagues suggest that the differences in levels of cooperation between conditions is indicative of insufficient group identity within the task-irrelevant condition, this effect of task relevancy could also be interpreted as evidence that group identity *in itself* is insufficient to enable robust cooperation (Bouas & Komorita, 1996).

Despite this critique, subsequent findings prevent us from ruling out the *contributory* role of identification processes. One such study is provided by Van de Kragt, Dawes, Orbell, Braver and Wilson (1986). The authors manipulated whether the cooperative choice benefited both the self and other group members (contingent condition), or just others (non-contingent condition). Prior to making their anonymous individual investment decisions half of the groups in each rule condition discussed the dilemmas, while the control groups remained silent. Results revealed an effect of self-interest, whereby the contingency rule

elicited higher rates of cooperation than the non-contingency rule. This effect was not however, apparent within discussion groups. That is, higher rates of cooperation were obtained in the non-contingency condition despite the fact that the benefits of doing so accrued only to *other* members' outcomes. Thus, supporting the group identity perspective, group discussion enhanced cooperation when any egoistic incentives to cooperate were removed and cooperation was purely for the benefits of other group members. Indeed a subsequent investigation from Caporael, Dawes, Orbell and van de Kragt (1989) reported that the content of group discussion implied a growing sense of identity as the majority of participants cited the welfare of the group when asked why they choose to cooperate following a period of discussion. It seems that following group discussion, the collective rather than the individual increasingly becomes the referent, (i.e. "what should 'we' do"). In this way group identity is said to contribute towards cooperative behavior that is independent of the consequences for the choosing individual (Dawes et al., 1990).

While we are compelled not to reject the role of group identification in discussion-induced cooperation all together, we contest the notion that group identification *alone* explains discussion induced cooperation, precisely because the available evidence does not support the sufficiency of group identification to ensure cooperation, nor, can the alternatively reality of multiple causal factors at work be ruled out (e.g. Bornstein, Rapoport, Kerpel & Katz, 1989; Bouas & Komorita, 1996; Chen & Komorita, 1994; Kerr and Kaufman-Gilliland, 1994). Accordingly, we do not terminate the process model here. Rather, we see group identification as playing a *contributing* role towards cooperative behavior, preceding and catalysing subsequent stages within the process model which serve to enable a more powerful communication effect.

To summarise, we argue that within the first stage of group discussion the nature of the dilemma becomes well-defined, but appropriate social behavior is not yet established. The

primary consequence of initial discussion is the enabling of group identification processes. We do not suggest that group identification is a dichotomous state and initial discussion is adequate to instil such a state. Rather, we argue that social categorization exist in a continuum (Tajfel, 1981) and begins to move *towards* shared category membership with resultant reordering of priorities within this phase of discussion. Equally, we do not suggest identification processes are restricted to this stage of discussion, instead we argue that identification processes precede and catalyze further processes facilitating mutual cooperation in the face of the tug of self-interest.

Conflict

We describe a lack of unity within the second stage of the process model as groups address a conflict of interest between individual and social rationality. Within this debate a 'cooperation-supported-wins' decision scheme is said to emerge, characterising this stage of discussion. We argue that the emergence of this preference is enabled by a shared conceptual scheme amongst group members and facilitated by enhancements in group identity enabled within the prior phase of discussion.

Laughlin and Ellis (1986) distinguish between two types of decision-making tasks: intellectual and judgemental. Intellectual tasks yield objective, 'correct' answers that are selected by the group as long as it contains one member who can successfully solve the problem and demonstrate the correctness of the alternative to the rest of the group. Judgemental tasks, on the other hand, require evaluative judgement; no correct answer can be authoritatively determined. If social dilemmas represented a purely intellectual task, we would expect mutual cooperation to be easier to encourage and would we not expect any deviation from this 'answer' once it is pointed out. Mutual cooperation is, however, unstable. No intervention has been shown to maintain 100% cooperation over time. Accordingly, we

perceive social dilemmas to be more analogous to judgemental tasks, within which mutual cooperation represents an 'optimal' rather than the objectively 'correct' alternative.

The group problem-solving approach (Hopthrow & Abrams, 2010; Hopthrow & Hulbert, 2005) integrates Laughlin and Ellis's (1986) framework into the social dilemmas domain to explain the group discussion effect. It is argued that given the structure of social dilemmas, it is uncommon for a group to contain a majority of people pre-disposed to act cooperatively. Given the robustness of the group discussion effect, the authors therefore suggest that it is more plausible that discussion enables a 'cooperation-supported-wins' decision scheme to influence the group (Davis, 1973). It is suggested that this decision scheme emerges because the social situation inherent within group discussions leads group members to perceive mutual cooperation as the optimal solution.

Support that group process can serve to demonstrate the optimality of the mutually cooperative solution is provided by Hopthrow and Abrams (2010). The authors tested whether discussion produced cooperative behavior even when all group members hold a unanimous initial preference for the non-cooperative choice. Previous research has shown that even when group members hold the same initial opinion, discussion can encourage groups to consider possible alternatives and promote decisions that diverge from original preferences (Parks & Nelson, 1999). Hopthrow and Abrams (2010) proposed that such reassessment may be more likely under conditions emphasizing the utility of mutual cooperation and thus exposing a convincing rationale for cooperation.

To test this prediction, participants were presented with a prisoner's dilemma within which the demonstrable optimality of mutual cooperation was manipulated by altering the dominance of the non-cooperative choice whilst keeping the k' parameter constant (Komorita, 1976). Individual's initial pre-discussion preference was used to assign them to

entirely cooperative or non-cooperative groups. After a discussion period groups were asked to form a group decision for either a) mutual cooperation, b) mutual defection or c) a mixed decision. Results revealed that groups composed of initially cooperative members were more likely to form cooperative group decisions than groups composed of non-cooperators. This effect was however, eliminated when the demonstrable optimality of mutual cooperation was high. That is, as it became easier to demonstrate the advantages of this alternative, group discussion as able to encourage cooperation, even in the face of an initial unanimous preference to appease self-interest.

The nature of a social dilemma is that arguments for the individually rational choice can be seen to be of equal merit as arguments for the mutually cooperative choice. However, as Hothrow and Abrams (2010) demonstrate when arguments for individual rationality are in conflict with pro-social arguments, the collectively rational preference can prevail. This asymmetry alludes to the presence of a shared conceptual system (Laughlin, 1980) undergirding the perceived optimality of mutual cooperation. This system, we suggest, comprises of certain, mutually accepted beliefs and values in favor of mutual cooperation, which when articulated are more compelling than other behavioral alternatives. We suggest that such components may centre on moral values, in particular, norms of fairness and egalitarianism. Many dilemmas involve groups in which deservingness of the group members is the same for everyone and do not entail any role differentiation; no members are higher status than any others, and thus it is likely to be agreed that every member is entitled to the same outcome. Moreover, the norm of equality is very influential in many group settings (e.g. Deutsch, 1975). Specifically in social dilemmas group members often prefer equal outcomes (Rutte, Wilke & Messick, 1975) and see such division as the fair thing to do (Messick & Sentis, 1979). Therefore, are likely to agree that no one should profit at the expense of another, but everyone deserves a fair share. Such norms and values prescribe for identical

action by the group. Since mutual cooperation ensures greater payoffs than mutual defection, this solution becomes optimal, and subsequently communication becomes a simple coordination tool.

Paralleling Hothrow and Abram's (2010) argument, we suggest that values comprising the shared conceptual system become salient during group discussion and when articulated resonate with other members, giving power to the mutually cooperative outcome. Alternatively, arguments not shared by the group i.e. those in favor of individual opportunity at the expense of collective risk, are demonstrably less advantageous within the social situation and resultantly will be much less persuasive. Expanding on the group problem-solving account we additionally suggest that identification processes may facilitate this process. Specifically, we propose that the alteration of participants' understanding of the dilemma in terms of increased concern for the group welfare initiated within the prior phase of discussion may serve to increase the availability of components of the shared conceptual scheme favoring mutual cooperation. As previously discussed, we do not believe group identification to represent a dichotomous state which initial discussion is sufficient to instill, rather we suggest that as the degree of identification increases, the optimality of arguments in favor of mutual cooperation become more obvious as the group become more relevant.

To summarize, we argue that within the second stage of group discussion group members address different viewpoints of appropriate social behavior. The crucial occurrence within this stage of discussion is the development of an understanding of the optimality of mutually cooperation, enabled by a shared conceptual system amongst the group. We suggest that the sense of group solidarity established within the prior, orientation stage of discussion interacts to facilitate this process, with stronger identification increasing the availability of arguments favoring coordinated cooperation.

Consensus

While the mutually cooperative solution is introduced to the group within the conflict stage of group discussion, we envision the third stage of the process model to be characterised by the formation of a cooperative group consensus as the majority of group members converge on this mutually acceptable alternative. While the group problem-solving explanation of the group discussion effect contributes to our understanding of the mechanisms by which this consensus is initiated, the effect of this consensus on cooperative behavior is elaborated by the perceived consensus explanation of the group discussion effect.

According to this approach group discussion offers group members the opportunity to develop to a perceived consensus to cooperate (Bouas & Komorita, 1996, Kerr & Kaufman-Gilliand, 1994). Such coordination of behavior is said to reduce the fear of exploitation and risk associated with the cooperative choice, as well as establishing a normative belief that others too expect them to commit to this consensus. While it was originally argued that this cooperative consensus needs to be unanimous amongst group members (Orbell et al., 1988), a less stringent view is now customary that a majority consensus is successfully elicits cooperation (Bouas & Komorita, 1996; Braver & Wilson, 1986). Indeed, as research within the jury decision-making literature demonstrates, ostensibly unanimity decisions often actually represent a majority decision with an acquiescing minority (e.g. Waters & Hans, 2009).

Research supporting the idea that commitment to a group consensus increases subsequent cooperation is plentiful. Orbell et al. (1988; Experiment 1) for instance, presented participants with a public good dilemma in which they could choose to either keep their personal endowment or surrender it for the benefit of other group members. After completing a period of task-relevant group discussion, the experimenter surprised participants by telling them that the beneficiaries of any endowments donated to the collective fund would actually

be members of a yoked group, rather than their own. Regardless of this disclosure, 59% of participants who engaged in group discussion choose to donate their endowment, compared to only 30% of participants in the control condition.

In a similar fashion Braver and Wilson (1986) presented discussion groups with a dilemma that required 3 out of the 9 group members to contribute their personal endowment in order for each non-contributing group member to gain a bonus.. It was observed that each group choose to hold a lottery to determine which group members should surrender their endowments. Despite investment decisions remaining completely anonymous, 71% of individuals who were selected in the lottery subsequently donated their endowments. It seems that in both of these experiments, group discussion served to establish a ‘social contract’ (Braver & Wilson, 1986) leading group members to honor their commitments regardless of the beneficiaries of their actions (Orbell et al., 1988).

A further investigation from Bouas and Komorita (1996) employed group discussion and common fate manipulations in a four-condition design to test the competing the group identity and perceived consensus explanations. Each of the three experimental conditions commenced the experiment by completing an adaptation of Kramer and Brewer’s (1984) common fate manipulation, shown to successfully bolster group identity. While one experimental group completed only the common fate manipulation, two experimental conditions subsequently engaged in either task-relevant or task-irrelevant group discussion. If group identification was driving the group discussion effect, it was hypothesized that all three experimental conditions would induce higher cooperation relative to the control / no-shared fate condition.

Results revealed that group discussion further increased the level of group identification measured with Hinkle and colleagues’ group identity scale (GIS; Hinkle,

Taylor, Fox-Cardamone & Crook, 1989), relative to participants who only completed the common fate manipulation and those in the control condition. However, while group identity was equally high within both discussion groups, *cooperation* was significantly higher in the task-relevant, than task-irrelevant discussion condition. Accordingly, Bouas and Komorita (1996) concluded that while group discussion may increase group identity, identification is not sufficient to elicit cooperative behavior without individuals perceiving a consensus to cooperate amongst group members.

In a similar vein, Kerr and Kaufman-Gilliland (1994) exploited the moderational role of the efficacy of the cooperative choice (for review see Kerr, 1996) in order to tease apart perceived consensus and group identification processes. The authors reasoned that if the group discussion effect is driven by increased identification with one's group we would expect to see an interaction whereby group members choose to cooperate to the extent that the cooperative choice is capable of increasing the group's welfare. If the effect is driven by commitments to a group consensus to cooperate, however, would we expect participants to honor these commitments regardless of how efficacious their contribution is for providing a public good ("If I promised to cooperate, I should do so, even if my cooperation turns out to have little impact", Kerr & Park, 2001, p. 119). In line with predictions, the authors observed that group discussion significantly increased rates of cooperation compared to baselines, and this effect was not moderated by the efficacy of the cooperative choice. That is, even when the cooperative choice held little weight for ensuring the attainment of the provision point for the public good to be provided, cooperation was still 30% higher in the discussion than a no discussion control condition. Although group identification accounted for some variance, the effect of discussion persisted when self-reported group identity was entered as a covariate.

However, while both Bouas and Komorita (1996) and Kerr and Kaufman-Gilliland (1994) present evidence against a *sufficient* role of group identity mechanisms, neither rules

out the role of identification within this stage. With the group identity explanation suggesting that discussion serves to increase the utility of others welfare, while the perceived consensus explanation focuses on the role of individual preferences, the two explanations have previously been understood as mutually exclusive. We argue, instead that the two processes work more interactively within this stage of consensus formation.

Indeed, Dawes and colleagues (Dawes et al., 1990; Orbell et al., 1988) do not dispute that discussion leads to a cooperative consensus. They do argue, however, that it is group identity rather than consensus that directly mediate cooperation. Chen (1996) similarly suggests that recognition that the group is consensual may serve to induce an enhanced state of perceived interdependence and common fate, increasing the value individuals place on their group membership and thus, increasing the likelihood of cooperation. This logic would however, predict a boost in cooperation within Bouas and Komorita's (1996) task-irrelevant discussion condition where both consensus and high identification are present. Such an effect was not apparent. Accordingly, we suggest that the alternative path is more plausible by which feelings of group identity *precede* and motivate members to commit to a consensus for mutual cooperation which then more directly influences cooperative behavior (Orbell et al., 1988).

In sum, we suggest that within the third stage of group discussion appropriate social behavior is agreed upon as the majority of group members converge on the mutually cooperative alternative. This cooperative group consensus serves to create an expectation that other group members will cooperate and an accompanying normative belief that others too expect them to honour this consensus. Furthermore, we suggest that previously established increases in group identification function within this stage to increase individuals' inclination to commit to the cooperative consensus.

Group Decision

While we suggest the optimality of mutual cooperation is first recognised within the conflict stage of group discussion and the majority of the groups converge on this alternative within the consensus stage, we define a final stage of discussion within which these processes cumulate in a group decision to cooperate. Internalised commitment processes are said to operate within the final stage to ensure that this group decision to choose cooperatively is translated into individuals' personal binding choices.

The final stage of group discussion characterises the point at which group members are able to declare "this is what we are going to do" and task achievement, at least at a group-level, is completed. While the group process-solving approach agrees that a consensus-based process underlies the communication effect, it is argued that a crucial outcome of this consensus is a *group decision* in favor of the cooperation, serving to enable a robust communication effect (Hopthrow & Abrams, 2010; Hopthrow & Hulbert, 2005). While consensus formation within the prior stage of discussion yields only a *perceived* distribution of preferences; the expectation of mutual cooperation can be cemented when a group decision to cooperate is rendered, providing a more tangible, formal basis for cooperative action.

Hopthrow and Hulbert (2005) provide evidence consistent with this notion. The authors presented discussion groups with the same six-player prisoner's dilemma game and randomly assigned them to high or low demonstrability conditions (as per Hopthrow & Abrams, 2010). Following discussions, groups were asked to make an explicit group decision about how members should choose before indicating their private, binding decisions. Results confirmed that individual's post-discussion choices were significantly more cooperative than pre-discussion choices. Moreover, no *pre*-discussion differences were found between the high and low-demonstrability conditions. However, *post*-discussion cooperative group decisions were more likely when the demonstrability of the cooperative choice was high. Crucially,

such group decisions significantly increased the proportion of cooperation in individuals' post-discussion individual choices.

The finding that cooperative group decisions enables a stronger group discussion effect can be interpreted as evidence that group decisions serve to activate an internalized commitment norm. Evidence of this norm is provided by Kerr and colleagues (Kerr et al., 1997; Kerr & Kaufman-Gilliland, 1994). The authors argue that discussion-induced cooperation is mediated by an internalised, personal commitment norm, rather than a social norm dependent on external censure (e.g., Bicchieri, 2005; Bicchieri & Lev-On, 2007). This norm is closely related to individuals' desire to maintain consistency between their beliefs and their behavior (Cialdini, 1984).

Support for this notion comes from Kerr et al. (1997). Within this experiment discussion groups received instructions regarding a step-level public goods dilemma and were randomly assigned to anonymity or non-anonymity conditions. All groups were informed that their group discussions concerning the dilemma would be videotaped whilst the experimenters left the room. In the anonymity condition, the experimenters returned to the room following the discussion presenting a destroyed cassette and explaining that the VCR had malfunctioned and accordingly the discussion had failed to be recorded. Individuals in the anonymous condition were additionally told that no one's investment decisions would ever be individually identified, whilst those in the non-anonymous condition were informed that each individual group member's decision would later be revealed to the group.

Results revealed that cooperation rates were equally high in the discussion groups regardless of anonymity condition. Accordingly, it was concluded that group members are bound to their mutually cooperative commitments by a predominately internalized commitment norm ("Even if others could not know that I had broken my commitment, I

would know”); Kerr & Kaufman-Gilliland, 1994, p.526). We suggest that individuals can personally commit to the cooperative choice at any point upon presentation of the dilemma, from which point we would expect internalised commitments to prescribe behavior.

However, we expect such commitments to be most pervasive amongst the group within this final stage of discussion as the group establish a collective commitment to the cooperative choice in the form of a cooperative group decision.

To summarise, the final stage of group discussion is reached when the mutually cooperative solution has gained enough support for a group decision to choose this alternative to be rendered. We argue that this decision serves to cement a previously established perceived consensus, providing a more tangible basis for cooperative action. This final group decision stage signals task completion at the group level and most closely precedes individual behavioral action. Internalised commitments are said to function in between this group decision and individual binding choices to ensure that the group decision to cooperate is maintained within individuals’ private and anonymous personal choices.

Iterated dilemmas.

Social dilemmas often do not entail ‘one-shot’ decisions but involve groups in sustained relationships that repeatedly encounter the same social dilemmas. Other process models of group decision-making including Kerr’s (1981) Social Transition Scheme suggest that group members can progress in a non-stationary fashion towards convergence on a decision. We similarly suggest that when discussion groups are faced with an iterated dilemma, the stages of the process model progress in a more recursive fashion (see Figure 1).

Research has shown that continuous or repeated communication between trials ensures the most robust communication effect within iterated dilemmas (Frolich & Oppenheimer 1998; Isaac & Walker, 1988; Ostrom, Walker & Gardner, 1992). For example,

within one investigation participants were paired with either a human confederate or a computer to take part in a prisoners' dilemma task with six rounds. Pre-trial discussion was permitted in only four of these rounds. Results demonstrated that cooperation rates dropped significantly in the no communication rounds relative to the communication rounds (Parise, Kiesler, Sproull & Waters, 1996). It therefore seems that cooperative intents may not always carry over when communication discontinued. Accordingly, we argue that when group are able to reach a cooperative group decision which is translated into subsequent individual behavior, and groups receive feedback to this effect, groups return through the consensus and group decision stages of the process model within subsequent trial discussions. Doing so allows group members to confirm the expectation that other group members will sustain their cooperative behavior and form a personal commitment to do the same.

Alternatively, research shows that when groups fall short of mutual cooperation, pre-trial or continuous discussion is used is to communicate disapproval of other member's defection (e.g. Frohlich & Oppenheimer, 1998). Jerdee and Rosen (1974) for instance, attribute the effective of continuous communication within iterated dilemmas to the transmission of "counter-reinforces", such as messages of social disapproval in response to defection. We therefore interpret this as evidence that feedback of low levels of cooperation within the group returns the group to a stage of conflict within which group members reconsider what constitutes appropriate behavior and attempt to achieve a more coordinated pursuit of mutual cooperation.

IV. Contributions of the Process Model of Group Discussion

Support for the process model of group discussion.

The process-model of group discussion represents a new, intuitive and accurate account of past research. As we have shown, the available evidence does not allow the role of any of the mechanisms subsumed within our model to be ruled out. Even tests designed to competitively separate the effects of divergent accounts actually point to the conclusion that these multiple mechanisms work interactively to drive the communication effect. The present review integrates these previously competing explanations into a subsuming process model of group discussion.

We do not perceive any of the stages outlined above to independently be sufficient to enable the robust communication effect that is routinely observed. Rather, evidence for each contributory mechanism is incorporated within a series of stages, which are said to cumulatively enable a more powerful communication effect (see Table 1). If discussion is terminated after only the orientation phase of discussion, we would expect to observe a slight increase in cooperation relative to no discussion baselines which can be attributed to increases in group solidarity and a resultant reordering of priorities. If discussion progresses to the conflict stage we expect further increases in cooperation as group members come to recognise the optimality of cooperation. Cooperation levels would further increase if the consensus stage is reached as the risk associated with the cooperative choice is reduced. The communication effect will be most powerful however, if a group decision is to cooperate is formed as a result of this consensus, enabling the most robust communication effect.

While we do not envision completion of all stages of the process model to be necessary to raise cooperation relative to no-discussion baselines, we do argue that groups must progress through these stages in the unitary sequence we set out. In this respect each stage forms a *necessary* element of a sequence enabling an incrementally stronger communication effect. We are confident in the order we define, because, logically, the

sequence articulated within our process model represent the *only* way in which the specified mechanisms can combine to facilitate cooperative behavior.

In order for individuals to address a conflict between individual and social rationality, individuals must first have a *representation* of the collective and an *understanding* of the nature of interdependence between group members which is established within the preceding orientation stage (i.e. without representing the collective there can be no conflict between the individual and that collective). Stages of conflict and disagreement between alternative courses of action that appeal to competing individual and social rationality must, in turn, precede stages within which agreement and consensus is reached as the majority of group members come to favor the mutually cooperation outcome (i.e. consensus cannot precede the very conflict that gives rise to the consensus). Finally, a cooperative group decision signifies the completion of consensus formation and emerges *as a result of* this group process when the mutually cooperative solution has gained enough support for a group decision to be made.

Convergent support for this sequence defined within the process model of group discussion is provided by the concordance between the steps we articulate and that depicted within empirically verified models of group development. Paralleling models of group development, we define an initial orientation stage of discussion focused around achieving a common task understanding. Tuckman (1965) argues that as a consequence of this common understanding a shared group identity begins to emerge. We similarly suggest that this initial discussion initiates a transformation of self-perception from the individual-level towards the group-level with resultant reordering of priorities. Tuckman describes the second stage of group development as a phase of disagreement as individuals challenge each other's perspectives and try to assert their own personal needs rather than accepting the groups' influence. In a similar fashion, we also describe a lack of unity within the second stage of the

process model as groups address a conflict of interest between individual and social rationality.

Groups are said to begin to accept the vital contribution of other members and develop mutual clarity with respect to the task at hand within Tuckman's (1965) third, norming stage of group development. We similarly envision the third stage of the process model to be characterised by the formation of a cooperative group consensus as the majority of the group come to favor this alternative. Finally, while Tuckman describes autonomous group members working independently towards achieving the agreed upon group goals within the fourth, performing, stage of group development, we similarly describe an *internalized* commitment to function within this final stage of discussion to ensure that the groups cooperative consensus is translated into individuals personal behavior even when the threat of external censure is absent.

Framework for future research.

The group discussion effect is founded upon research utilising small laboratory groups, containing between two and nine discussants. While trends in the effect size across these studies can be observed (Balliet, 2010), no research, to our knowledge, has directly examined whether the group discussion effect generalises to groups larger than those which can be recruited in experimental settings. The theoretical reasoning within our process model would predict the discussion effect to persist within moderately large groups as the chance that the group contains at least a minority who recognises the optimality of the mutually cooperative outcome is increased. However, when group sizes become very large, the coordination required for progression through stages of consensus and group decision is difficult to establish, and we would therefore expect the communication-cooperation relationship to weaken.

Additionally, research underlying the group discussion effect is based on discussion manipulations of different time limits. Research has been unable however, to conclusively determine how this variant may moderate the communication-cooperation effect size (Parks & Cowlin, 1995) Our model would predict a generally stronger communication effect when discussion time is ample, as groups are afforded opportunity to progress through more facilitating stages providing a cumulatively stronger effect on cooperative behavior.

Similarly, the group discussion effect is founded upon research conducted on groups formed on an ad-hoc basis who have had no prior contact. Our model would predict an even stronger effect of discussion however within pre-formed groups. It could be predicted that groups will travel faster down the road to convergence when they are more accustomed to working together (Kerr, 1981). For instance, within pre-formed groups as the orientation phases of discussion may be more quickly completed allowing greater opportunity to progress through subsequent stages. Further research should be conducted to provide empirical support for these hypotheses generated by our process model and reciprocally broaden the scope of the group discussion paradigm.

The Problem of Application

While clarifying the theoretical basis of the group discussion effect is crucial, identifying ways of promoting cooperative behavior is more than just a theoretical issue. The problem arises because despite the enormous potential of the group discussion effect for increasing social harmony, the solution inherently possesses limited utility beyond the laboratory for simple reasons of practicality. Cooperation is a function of group interaction, yet, many *real-world* dilemmas are not faced by small, face-to-face groups. Direct communication among all decision makers does not represent a feasible solution within such large groups extended in both space and time (Messick & Brewer, 1983). Crucially, this situation typifies some of the most pervasive dilemmas we face (such as energy conservation

or recycling; national level concerns that rely in individuals' behavior change). Indeed, even if group sizes are small enough to allow direct communication amongst all decision-makers, (i.e. dilemmas restricted to local communities) direct discussion can be costly and logistically difficult. Providing public space for such communication represents a public good dilemma in itself (Bicchieri & Lev-On, 2007).

Messick and Brewer (1983) note that in light of such restraints, research must progress to take what we know about why discussion alters group members' choice behavior and consider alternative ways to produce the same effects. However, despite the increasingly great societal need for interventions to promote individual restraint, coupled with the potential for discussion-based interventions to increase social harmony, surprisingly little research has been conducted to this aim. Rather than accepting the inevitability of the premature closure of research, we argue that we should look to advance *indirect* means in order to capitalise on the benefits of the group discussion effect without the limiting requirement of collocation.

However, while indirect discussion-based strategies may represent the only pragmatic means of capitalizing on the benefits of the group discussion effect, they will inevitably produce weaker effects than direct discussion itself (Fazio, Powell & Herr, 1983). We therefore suggest that such interventions should be firmly grounded in an *integrated theoretical model*, allowing us to harness the combined benefits of multiple contributing factors and thus increasing the efficacy of these more pragmatic interventions to approximate direct communication effects. We now discuss a number of possible platforms to achieve this aim, providing a much more optimistic view concerning the application of the group discussion effect than is common in the literature.

Discussion between representatives. Laboratory studies have shown that communication among subgroups within a larger group can successfully increase rates of cooperation. Braver and Wilson (1986) for instance, found that when discussion was permitted prior to investment decisions within, but not between subgroups of three individuals, cooperation was significantly higher (75%) than the no communication control condition (48%). We perceive this partial communication effect to have important, yet unexplored applications for large dilemma groups and groups communicating over long distances (e.g. multinational organizations).

One possible solution stemming from these findings is the establishment of communication network amongst *group representatives*. Such spokespersons could be elected by the group to form a representative, deliberative democracy. Although the mechanisms underlying the partial communication effect are not well defined, we would expect the subgroup to progress through the standard stages of the process model of group discussion. Following discussions, representatives can communicate the proceedings of the discussion to the larger group in a more pragmatic, indirect and uni-directional manner. Doing so may allow the crucial mechanisms underlying direct discussion effects to be vicariously established within the entire group. Legitimate representatives will, for instance, be able to instil a common understanding of task requirements amongst members and demonstrate the optimality of the mutually cooperative solution. Just as individuals feel obligated to group decisions established via direct communication, so too would we expect individuals to feel bound to group decisions agreed by democratically elected discussants on their behalf.

Inherent in this strategy, however, is the risk of a second-order dilemma (Ostrom, 1990). It is not in individual's self-interest to expend their own effort or time to engage in communication if their contribution is not crucial to enjoy its benefits. If, however, all group

members reason accordingly and decline to represent the group, no one will enjoy rewards of communication. Establishing less costly forms of indirect communication in which *all* group members could feasibly participate may bypass this potential caveat. .

Computer mediated communication. One such alternative is computer-mediated communication (CMC). With the advance of globalized communications infrastructures within our lifetime it is not uncommon to maintain contact with friends, family and colleagues electronically. The idea of capitalising upon this opportunity to increase cooperative behavior within dilemma situations is receiving increasing research attention (for review see Bicchieri & Lev-On, 2007). Two forms of CMC used to this aim can be conceptually distinguished; those which operate an entirely text-based programme, and those that additionally incorporate audio-visual elements.

Initial research has supported the utility of text-based CMC to improve cooperation relative to no-discussion baselines. Jensen, Farnham, Drucker and Kollock (2000) for instance found that participants permitted to communicate using a text-to-speech interface were significantly more cooperative in a dyadic prisoner's dilemma game than those in a no-communication control condition. Frohlich and Oppenheimer (1998) similarly found that participants contributed significantly more of their endowment in a continuous public goods game on trials when they were allowed to communicate with group members via email, than on trials where no communication was permitted. Unfortunately, however, the magnitude of these effects typically fails to approximate that of direct, face-to-face group discussion (Balliet, 2010).

Videoconferencing CMC may hold more promise, however, with initial evidence suggesting that such methods can produce comparative levels of cooperation as face-to-face discussion (Bos, Olson, Gergle, Olson & Wright, 2002; Brosig, Ockenfels & Weimann,

2003). In a similar vein to our argument that indirect discussion-based techniques should be firmly grounded in an *integrated* theoretical model, Bicchieri and Lev-On (2007) argue that the success of videoconferencing CMC lies precisely in the medium's ability to support more of the required elements of the direct discussion effect.

Nevertheless, despite its promise to overcome physical distance between group members, methods of videoconferencing cannot overcome temporal distance between discussants. Additionally, while the requirement for all participants to contribute towards the discussion within CMC interventions successfully avoids a second-order dilemma, antecedents of social loafing can be more prevalent within online groups than real groups (Piezon & Donaldson, 2005). If individuals begin to notice that certain group members are not responding to emails or engaging in virtual discussions these actions may be construed as free-riding on others efforts, resulting in a collapse in effort and thus preventing the benefits of discussion being realised.. We propose that one means of overcoming these limitations may be to tailor indirect discussion-based strategies to the *individual-level*, rather than group-level.

Establishing mediating factors independently. Establishing the mediators of the communication effect independent from any form of discussion represents the most intuitive way to replicate the effects of the group discussion at the individual-level. Unfortunately, this currently represents an underspecified solution. Our process model provides a clear depiction of the underlying mechanisms that interventions should aim to establish.

Firstly, we argue that discussion serves to increase identification or solidarity amongst group members. Such identification may be manipulated independently from discussion, for instance, by inducing perceptions of common fate within environmental campaigns (Kramer & Brewer, 1984), reminding individuals that the consequences of issues such as

environmental degradation and resource depletion pertain to *all* members of society.

Secondly, our model suggests that cooperation is facilitated by the emergence of an understanding of the optimality of mutual cooperation. Replicating this effect outside of discussion strategies may entail the presentation the arguments for the “correctness” of collectively rational behaviors, for instance in the form of information campaigns detailing the status of depleting natural resources. We suggest that a stage of consensus serves to reduce the risk associated with the cooperative choice and engage normative pressure to conform to this norm. Applications integrating household energy usage information within social networking mediums, making individuals adherence to the cooperative consensus public, may offer promise in this sense. Finally we suggest a group decision to cooperate serves to activate an internalised commitment norm ensuring that this decision is translated into individuals’ personal, binding choices. Strategies maximising dissonance between defective behaviors and internalised beliefs may be applicable here.

Establishing mediating factors independently, absent of any form of discussion may help overcome the problems pertaining to group-level strategies. However, as we argue within this review, each mediator of the direct discussion effect works within in a necessary sequence to enable a cumulatively stronger effect on cooperative behavior. Accordingly, for this strategy to be maximally effective, mediating factors must be induced within this defined order, a feat that may prove logistically difficult, costly and time-consuming.

Imagined group discussion. Rather than implementing individual interventions to recreate each stage of discussion in turn could we just simulate each stage? Mental simulation can be defined as the “imitative representation of some event or series of events” (Taylor, Pham, Rivkin & Armor, 1998, p.430). A promising body of research demonstrates the power of simulation techniques for a wide range of phenomena within nearly every domain of psychology (for review, see Crisp, Birtel & Meleady, 2011). There has, however, been no

investigation into the impact of mental simulation within the social dilemmas literature, yet there are good reasons to think that such integration would be beneficial.

Crucially, research demonstrates that mentally simulating social situations can elicit the same attitudinal, affective and behavioral effects as the actual experience itself. For instance, replicating the bystander apathy effect, Garcia, Weaver, Moskowitz and Darley (2002) found that participants who imagined going out for a meal with ten others were subsequently less likely to help the experimenter by participating in a second experiment than those who imagined going out for a meal with just one other person. Similarly, Turner, Crisp and Lambert (2007) demonstrated that imagining a positive interaction with an out-group member improved out-group evaluation, mediated by reduced intergroup anxiety, the same *affective process* triggered by actual intergroup contact (Pettigrew & Tropp, 2006). Likewise, Stathi and Crisp (2008) found that imagined contact also facilitates projection of positive personality traits, the same *cognitive process* that mediates the contact-bias relationship (Pettigrew, 1998). In line with these findings, we suggest that positive mental simulation of each of the crucial stages underlying the group discussion effect according to our process model will serve to activate conscious processes that parallel those normally associated with face-to-face group discussion, and thereby eliciting cooperative behavior.

We propose that imagined group discussion represents a versatile and inexpensive strategy lending itself to application within societies' most imperative dilemmas. Water conservation campaigns, for instance, may productively encourage individuals to simulate the stages of the process model in cooperative manner, producing a perceived consensus among community members to reduce their water consumption. Increasing the availability of this decision serves to clarify the nature of the social problem and will reduce individual's perceptions that their individual efforts will be in vain. Public television channels that rely on

viewer contributions for their continued existence could similarly incorporate imagery techniques within funding drives to generate normative pressure to uphold a simulated consensus amongst viewers to make a donation. The blood donation service may also incorporate methods of imagery into their appeals, facilitating the development of an internalised commitment amongst observers to uphold their intentions to become donors. In this way we suggest simulation of the stages of the process model of group discussion will serve to practically establish the cognitive groundwork for the cooperative choice.

Furthermore, research has demonstrated that after imagining a hypothetical future behavior, participants express greater intentions to engage in the activities (Carroll, 1978; Crisp et al., 2010; Pham & Taylor, 1999; Ross, Lepper, Strack & Steinmetz, 1977; Sherman, Zehner, Johnson & Hirt, 1983). Accordingly, we further predict a secondary effect of imagined group discussion whereby imagery interventions serve to increase individuals' inclination to seek out opportunities for more powerful, face-to-face negotiation when opportunities are available (e.g. by attending community meetings or focus groups). Advancing imagined group discussion interventions therefore represents an important agenda for future research.

Conclusions

The comfortable perception that our individual efforts towards maintaining social harmony are dispensable no longer bears scrutiny. Widespread concerns from environmental degradation, to elimination of the budget deficit, to over-population, serve as compelling reminders of the urgent need for research to find means to encourage individuals to sacrifice self-interest in favor of more cooperative, socially responsible behavior. Amongst this research one robust finding has emerged; a period of task-relevant discussion amongst decision-makers significantly increases rates of cooperation.

Borrowing Pruitt and Kimmel's (1977) expression, we perceive that research specifically focused upon this group discussion effect is 'alive', but its health is doubtful. While it is beyond empirical dispute that group discussion robustly increases rates of cooperative behavior, research has failed to establish a 'process-orientated' theoretical framework explaining this effect. The present review draws a line under existing competitive tests of 'single-cause' accounts and provides a more complete theoretical picture of how interrelated factors combine to facilitate cooperation within group discussions. Aspects of each of the previously competing explanations of the group discussion effect are subsumed within the model and are said to make incremental, cumulative contributions towards cooperation in a sequential fashion within four stages of *orientation, conflict, consensus* and *group decision*.

The process-model of group discussion represents a new, intuitive and accurate representation of past research. We argue that, logically, the sequence articulated within our process model represents the only way in which mechanisms can combine to facilitate cooperative behavior. The concordance between the steps we articulate and that depicted within empirically verified models of group development provides convergent support for our model. The process model of group discussion also represents an important new area of theoretical understanding and potential exploration; our hope is that it will serve as a theoretical framework or grounded theory, guiding future analysis of group interactions.

Finally, the review considered the problem of lack of opportunity for direct discussion as an explanation for the shortage of applied research. Rather than accept the premature closure of applied research, we argue that we should look to advance *indirect* means to capitalise on the benefits of the group discussion effect without the limiting requirement of collocation. Crucially, we argue that grounding such indirect strategies in our integrated process model will increase the efficacy of these more pragmatic solutions, bringing research

surrounding the group discussion effect back in line with Pruitt and Kimmels' (1997) and Komorita and Parks' (2005) prescriptions. In so doing this may allow the benefits of group discussion to be realized in the most pressing real-world dilemmas we face, from the interpersonal to the international.

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