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Groupthink and Project Performance: The Influence of Personal Traits and Interpersonal Ties

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This study explores whether the negative impact of "groupthink concurrence-seeking behavior" (GTB) on business process reengineering (BPR) projects is affected by group members personal traits and interpersonal ties within the group. To this purpose we conduct and present the results of a longitudinal controlled field experiment over 18 BPR projects lasting 3 months and involving 18 teams comprising 71 first-year MBA students. The main contribution of this study is twofold. First, we explicitly consider and measure the core construct of groupthink phenomenon: that is, GTB. Existing organizational behavior literature has, contrarily, considered only its causes, symptoms, and outcomes. Second, we show evidence that GTB does have a negative impact on group performance in BPR project settings. In this regards, results also indicate that while perceived control, conscientiousness and interpersonal evaluation mitigate the negative impact of GTB on group project performance, confidence, and previous relationships amplify this negative impact, even if they have a direct positive effect on performance. Thanks to the findings of this study, we are able to provide valuable suggestions to managers in charge of BPR projects for ensuring effective performance of project teams and controlling for potential obstacles due to GTB.

Key words: behavioral operations management; groupthink; business process reengineering; concurrence-seeking behavior
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1. Introduction

Intra-organizational collaboration is fundamental for business activities (Muganda et al. 2012) and, thus, group decision-making processes play a critical role in determining performance. This is particularly true in project settings, where activities are organized and carried out by *ad hoc* teams that jointly (rather than individually) confront decisions to be made (Bendoly et al. 2010b). However, pathologic group behavior may occur and negatively influence the quality of the way groups make decisions and, consequently, final project performance. One example of such adverse group behavior is "Groupthink Behavior" (GTB) also known as "groupthink concurrence-seeking behavior" and referred by Janis (1982, p. 9) as "a mode of thinking that people engage in when they were deeply involved in a cohesive group, when members striving for unanimity override their motivation to realistically appraised alternative courses of action."

Groupthink phenomenon has been initially investigated in decision-making processes of political and military contexts; subsequently, it has been studied in the field of human resource management and other business contexts. Although identifying the causes and the effects of this phenomenon would be of great utility whenever decisions are taken by groups, very few studies exist in the context of operations management with the most of them focused on the project management literature (e.g., Akgün et al. 2006, Brockman et al. 2010, Muganda et al. 2012).

In fact, the behavioral operations management (BOM) literature has increasingly focused its attention on psychological factors and dynamics that drive operations on the individual worker level (Bendoly 2006, Bruccoleri et al. 2014, Butler et al. 2009). Indeed workers' behaviors in operating conditions have an impact on the nature (both quantity and quality) of the work they contribute to, and in turn on the profitability of firms that critically rely on the effectiveness of these workers (Bendoly 2006, Brah et al. 2000, Cantor and Macdonald 2009, New 1998, de Treville and Antonakis 2006, Wingaard et al. 2006). Furthermore, behavioral factors influencing individual decision making have been investigated in a wide variety of areas of operations management. Among them: revenue management (Bearden et al. 2008, Bendoly 2011, Su 2009); inventory management

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(Gavirneni and Isen 2010, Strohhecker and Größler 2013, Su 2008); logistics and marketing coordination (Keller et al. 2006); manufacturing process innovation (Azadegan and Dooley 2010); service operations management (Bitran et al. 2008, Veeraraghavan and Debo 2011); security management (De Koster et al. 2011); process planning and scheduling (De Snoo et al. 2011); performance management (De Leeuw and van den Berg 2011), supply chain management (Li and Wang 2007, Oliva and Watson 2011, Powell Mantel et al. 2006, Wu and Katok 2006).

While Bendoly et al. (2010a) recognize group dynamics as one of the four main bodies of knowledge in behavioral operations, very few studies in the BOM stream of research focus on group decision-making process in an OM context and its impact on performance (Bendoly and Swink 2007, Bendoly et al. 2010b, Lee et al. 2013). Among these, Wu and Seidmann (2015) using a laboratory experiment investigate the difference between groups and individuals in newsvendor ordering behavior and find that group decision making is not always superior to individual decision making. Groups make better ordering decisions and earn higher profit only in low profit conditions; also, groups take longer time than individuals. Still in the newsvendor context, Gavirneni and Xia (2009) find that subjects in groups demonstrate a lower propensity for error than their individual counterparts.

In conclusion, very few studies investigate group decision-making dynamics and, in particular, groupthink behavior in an operations management context. However, as we will present in section 2 of this study, many operations management activities require group decision-making processes, and groupthink may arise in any of them.

Our research aims at enriching the academic as well as the practitioner operations management community, that call for further research in integrating behavioral theories in operations management settings (Ahmad and Schroeder 2003, Bendoly et al. 2006, Liden and Antonakis 2009). In particular, we wish to contribute to the body of knowledge regarding group dynamics in operations by investigating the criticality of GTB and providing some remedies to limit the emergence of such behavior and in turn to limit the losses for group performance. More specifically, our research is conducted in a business process reengineering (BPR) project context where we investigate how GTB interacts with group member personal traits and interpersonal ties and in turn influences the project performance.

Laboratory experimental methods are a well-established paradigm in BOM research (Bendoly and Swink 2007, Croson and Donohue 2006). In this study, we test for the interacting effects of personal traits and inter-personal ties with GTB on group project performance, over a whole project life cycle. In particular we conduct a longitudinal controlled field experiment across 18 projects lasting 3 months and involving 18 groups comprising 71 first-year MBA students that had to carry out the BPR project as part of the business process management (BPM) compulsory class at an Italian university.

This study is organized as follows. In the next section we provide some example of GTB occurrence in production and operations management contexts. In section 3 we examine the literature associated with our research objective and develop our hypotheses. In section 4 we describe the research protocol we adopted. Analyses of collected data and results are reported in section 5. Finally in section 6, we present the findings of this study, discuss their implications for research and practice, and outline future directions of the research in this field.

2. Groupthink in Real Operations Management Contexts: Some Examples

Groupthink has been revealed in a number of operations management contexts, including production and quality control, new product development, and disaster operations.

In the context of production and quality control teams, we found three case studies conducted by Manz and Sims (1982) that discovered groupthink's effect on autonomous operative groups belonging to a non-unionized battery assembly plant in the United States. Each work group had weekly team meetings that served as the problem-solving forum in which issues such as production problems and group member problem behaviors (e.g., absenteeism) were addressed. The first case study regarded one weekly group meeting of a production group in the plant (approximately twelve people were present) where a group member (the "deviant") raised the issue of changing group working shift hours (start and end earlier), whereas other group members responded quickly with reasons why changing shift hours was a poor idea. During the decision-making process a number of groupthink symptoms (as identified by Janis and Mann 1977) emerged: (i) the team leader and other group members applied "direct pressure" to the deviant and the subject was finally dropped; (ii) "illusion of unanimity": the group leader assumed that all were in agreement; (iii) "self-censorship": several non-verbal signals (e.g., frowns, tense movements, gestures suggesting anger) indicated that although several group members did not agree with the outcome, they did not express their views. The

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second case study regarded another group meeting consisting of approximately six individuals working in a quality control laboratory, whose primary work involved checking battery materials for defects. One group member raised an issue concerned with the fact that the quality control group was targeted by a particular production work group who was dissatisfied with excessive "down time" that they blamed on the laboratory workers. After a long meeting the issue was dropped with no solutions to the problem expressed. Group members seemed to be satisfied that they were in the "right" and that the complaints received were unreasonable and unjustified. Even in this case a number of groupthink symptoms emerged (we are not reporting them here for sake of brevity). Finally the third case regarded a production group of approximately eight individuals, concerned with a quality control problem with battery casings. It happened that while in the first part of the discussion all group members freely expressed their opinion, in the second part the external group leader limited the group members' participation substantially by presenting the steps he wanted the group to take. Finally the meeting ended with essentially a one-way flow of communication and the group members did not verbally contrast the leader's decision, although they showed non-verbal disappointment (e.g., facial expressions). Again, the authors identified a number of groupthink symptoms in this decision-making process.

Groupthink has been revealed also in the context of new product development (NPD). For example, Brockman et al. (2010) conducted case studies based on interviews with leaders and members of 12 NPD teams belonging to US companies representing 11 different industries. One of their findings is that NPD teams with a high level of interpersonal cohesiveness were disclosing a certain level of groupthink behavior. Also, they found that open group norms (i.e., those that encourage openness, playfulness, and disagreement) lessen the likelihood that interpersonal cohesiveness will lead to groupthink. In particular they underline that team leaders play an important role in establishing and carrying out open team norms. In this regard they report the statement of a product manager who claims:

> I always encourage members to voice their disagreement at any stage of the product. Again, we have a disciplined method of doing that. And you have areas where you disagree, and you argue it out and you work things out, the parameters, the specifications, the construction method. You do that and you move on.... Even if it's a friendly group there's a lot of proving and prodding and picking at each other, but it's so you can express those contentions and ideas —come to a consensus if it's possible. (Brockman et al. 2010, p. 211)

Still in the NPD context, a number of groupthink symptoms have been collected by McAvoy and Butler (2009) during a longitudinal case study over two Agile Software Development (ASD) project teams (both of which comprising six developers and a project manager). For example, regarding the symptom "little or no consideration of alternate plans", the authors report that "*the project manager and developers decided against the use of several Agile processes/techniques in favor of less effective ad hoc traditional methods*" (McAvoy and Butler 2009, p. 377).

Groupthink was also revealed in the realm of disaster operations management (i.e., in a crisis context). For example, Tennant (2011) conducted an exploratory case study which has evidenced the risk of groupthink occurrence and ineffective decision making in emergency scenarios.

3. Theory and Hypotheses

GTB was originally described by Janis (1972) as a concurrence-seeking behavior of group members that interferes with effective group decision-making processes, leading to poor decisions and, in turn, inducing fiascos.

The groupthink model (Janis and Mann 1977) provides a comprehensive explanation of GTB. It shows the antecedent conditions (e.g., group cohesiveness, structural faults of the organization, and provocative situational context), the symptoms (e.g., illusion of invulnerability, unanimity and morality, rationalization to delete feedback and views opposite to group position, and self-censorship), and the consequent defective decision-making practices that finally lead to poor quality outcomes.

Since the groupthink model was proposed, a lot of empirical research work has been done to test its validity (Esser 1998). However, the results provide only partial validation of it (Esser 1995, Herek et al. 1987, Leana 1985, Moorhead and Montanari 1986). In fact, researchers have criticized groupthink for several reasons. One major critique to Janis's (1972) discussion on groupthink is the negative evaluation of groupthink itself as addressed by Longley and Pruitt (1980), who argued that only a premature concurrence-seeking tendency occurring before consideration of critical options is detrimental to performance. Moreover, in some cases, concurrence seeking might actually improve group performance. For example, Sniezek (1992) reported that group discussions focusing on shared information enhance members'

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confidence and commitment to the group's decisions and actions, and in turn improve group performance. Furthermore, even premature concurrence seeking may be recommended if the issue to deal with is not complex. In a survey study, it was concluded that "*the relationship between groupthink-induced decision defects and outcomes were not as strong as Janis suggests*" (Moorhead and Montanari 1986, p. 399). Another criticism to the groupthink model is related to the fact that GTB deals with only the first half of a general problem-solving process. In fact, of the five steps that compose this process (i.e., problem identification, alternative generation, alternative evaluation and choice, decision implementation, and decision control), GTB may happen just in the first three and does not deal with the steps regarding decision implementation and control (Aldag and Fuller 1993). Counter arguments to the negative effect of concurrence seeking have also been recently presented in a research conducted by Bendoly (2014). He provides empirical evidences that shared mental models do promote both the quality of information shared in the group setting and the degree of psychological safety among team members, and in turn the team's project performance. In other words, severe differences in the way project members think about problems they face can create social divisions in group dynamics, that in turn "*can shut down the very sharing that could otherwise resolve differences in understanding*" (Bendoly 2014, p. 1363).

Theorists and researchers have responded in two ways to contrasting results on the groupthink phenomenon and its facet of concurrence. From one side, some authors re-evaluate the underlying theory about concurrence seeking, its causes and impact on decision-making behavior in groups (Neck and Moorhead 1995). From the other side, a different stream of research, going beyond the model proposed by Janis and Mann (1977), investigates different combinations of the relationships among the constructs (Chen et al. 2009, Park 2000) and adds some new variables to the original groupthink model (e.g., Neck and Moorhead 1995).

This study is positioned in the second stream. In fact, our groupthink model reveals the presence of two new moderating factors that influence the effect of GTB on performance, namely individual and interpersonal group members characteristics. While, indeed, the role of group characteristics (e.g., cohesiveness, collective efficacy; Whyte 1998) in groupthink literature has been definitely analyzed, the role of group members' personal traits or inter-personal ties did not receive much attention. However, social network theory suggests that personal traits deeply influence the way in which people develop their social network (Dougherty et al. 2008) and value personal connections (Bendoly et al. 2010a). Being aware of these elements is without doubt crucial to better understand the relationship between operations-related project setting and GTB.

As already mentioned, the groupthink model has been initially developed and tested in decision-making processes of political and military contexts where ineffective decision resulted in obvious disasters. However, the potential for groupthink is likely to exist in any organization (Carrell 2010, Finkelstein 2003, Miller 1990, Tasa and Whyte 2005) and in various managerial domains including management communication (Eaton 2001), decision making (Miranda 1994), organizational teams management (Kayser 1994), and also in operations management contexts as showed in section 2 of this study. While a team of people involved in an operations-related project within an organization is potentially subject to groupthink behavior due to the provocative context in which it operates (i.e., project uncertainties, constrains, and external threats), not many studies have been focusing on groupthink in this context. For example, Muganda et al. (2012) observed the presence of groupthink in the requirement engineering process of IT projects and proposed crowd-sourcing as a mechanism to contrast it. Other studies found that cohesiveness among group members, both in new product (Akgün et al. 2006, Brockman et al. 2010) and software development (Coyle et al. 2013, McAvoy and Butler 2009) project teams, positively influences the level of groupthink within the teams, that, in turn, has a negative impact on project performance. Further researches explored other causes of groupthink in operations-related project settings: change management projects (Thiry 2001), NPD projects (Bourgeon 2007), and in new call-centers' setting up projects (McElhinney and Proctor 2005).

In conclusion, our research is positioned within and wishes to contribute to the field of studies which try to understand the linkage between groupthink concurrence-seeking behavior (GTB) and group project performance. To this purpose we re-consider the Janis's model (1972) that in the last 40 years has received only ambiguous empirical support. We hypothesize the role of moderating effects of the above linkage, to explore potential managerial leverages to dampen the negative effect of GTB. We explicitly consider and test our model in an operations management context.

In particular, we develop and empirically test hypotheses on how group member's personal traits and interpersonal ties interact with the GTB and, in turn, negatively or positively moderate its influence on group performance. Figure 1 captures the conceptual model of this research.

We start with the premise that the negative effect of groupthink concurrence-seeking behavior is mainly

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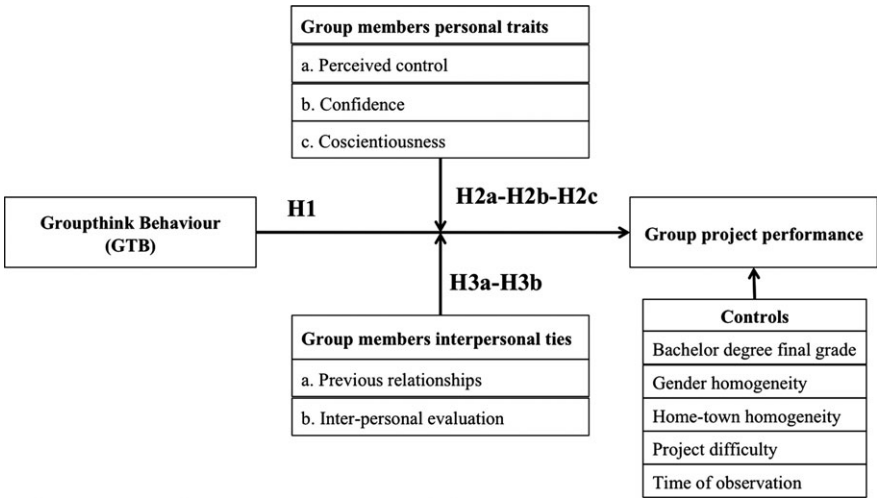
Figure 1 Research Conceptual Model



due to the fact that it reflects a low exchange of opinions among group members and a lack of constructive discussion (Chapman 2006). According to the groupthink model (Janis and Mann 1977), group concurrence-seeking behavior in decision-making processes negatively affects the success of decisions because this behavior makes the group limit its discussions to only a few alternatives and objectives, to ignore new information concerning risks and drawbacks of decisions, to underestimate information concerning the benefits of rejected alternatives, and to not develop contingency plans facing potential negative scenarios. In fact, (i) it unconsciously prevents group members to manifest their own opinion, even when they have one (Manz and Sims 1982); (ii) it lets group members feel satisfied even if the group decision does not reflect their thinking and there is no real reason to consider the group decision to be better than their own ideas (McAvoy and Butler 2009). Then, it constitutes a negative behavior in group dynamics, and, in turn, results in lower group performance.

We therefore formulate our first hypothesis accordingly:

Hypothesis 1. *In group project-decision processes, GTB has a negative impact on project performance.*

3.1. Groupthink Behavior and Performance: The Moderating Effect of Group Members' Personal Traits

Despite the fact that a substantial amount of literature exists investigating the relationship between group characteristics and groupthink effects, hardly any study considers the interconnection between GTB and group members' personal traits. The only exception is the research by Schafer (1999), which investigates the role of the group leader's personality in GTB.

Personal traits, that is, individual behavior and characteristics, can either weaken or amplify the negative effect of GTB on group decisions effectiveness. In particular, we focus on the same three characteristics explored by Bendoly et al. (2010b) in a project management setting and relate them to individual behavior: perceived control, self-confidence, and conscientiousness. These characteristics make people see their action as they were influenced mainly by them and not by others or by external factors (*perceived control*), feel they are particularly competent in achieving success (*confidence*), and accept a high responsibility for their actions (*conscientiousness*).

As already said, one of the main reasons why concurrence-seeking behavior negatively affects the success of decisions relates to the fact that this behavior makes the group limit its discussions. As shown by Manz and Sims (1982), decisions made (which pretend to be group decisions) are instead mainly taken and motivated by one (generally the group leader) or few members. The final "group" decision (for sake of clarity we quote "group" because the decision is actually made by one or few members) lacks the value-added by critical thinking and constructive discussion among all the individuals involved in the group; this increases the likelihood of poor decision outcomes (Longley and Pruitt 1980).

However, when the person or the few people that are making the "group" decision own a high level of perceived control, it is likely that they assume things to happen mainly because of their actions, rather than because of others or external factors; then these members will be more likely to make rationally based decisions and to look for valuable sources that can support them in making the right decision. According to Bendoly et al. (2010b, p. 463) these kinds of people *"[. . .] who view events in their own work context (e.g.,*

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project setting) to be controllable by internal actions, will tend to appreciate the value of any involvement (even external) *facilitating such actions*" (Bonoma and Johnston 1979). Consequently, even if a certain level of groupthink concurrence-seeking behavior exists, it is likely that the final "group" decision will benefit by the positive influence of the perceived control inherent to those (few) members who made the decision. As a consequence, the "group" decision will anyhow benefit from valuable source of information found outside the group, provided by people in the group with high level of perceived control. For example in the BPR context, members with high perceived control will appreciate and strongly take into account any involvement and/or suggestion coming from outside the group but controllable by internal actions (e.g., from previous BPR projects, from other colleagues expert in BPR, from people working in the business process involved in the BPR, or other people working in the company, etc.). Accordingly, we propose the following hypothesis:

HYPOTHESIS 2A. *In group project-decision processes, members' perceptions of internal control negatively moderates* (*weakens*) *the adverse effect of groupthink behavior on project performance.*

On the other side, if the person or the few people that are making the "group" decision consider themselves as particularly competent (compared to others in similar settings) in achieving success, then it is likely that the negative effect of GTB will be exacerbated by over-confidence related bias (Ghosh and Ray 1997, Krueger and Dickson 1994). This over-confidence bias manifests basically in two forms.

The traditional overconfidence bias is the one referred by Healy and Moore (2007) as "over-precision" and occurs when individuals believe that their information is more precise (i.e., accurate within a tighter confidence level) than it is. In an OM context, this bias basically manifests in an under- or over-estimation error of a decision maker. For example, Croson et al. (2008) show that in the newsvendor model "over-precision" leads to under-ordering when the ratio of price to costs is high (high-margin goods) and over-ordering when the ratio of price to costs is low (low-margin goods). In the context of a BPR project, such an error could lead to under- or over-implement a specific best practice for process redesign without considering the related consequences. For example, overconfident people could over-apply *task-automation* or *task-elimination* practices without considering the issues arising from the resulting *technology integration* requirements, its related costs, and the problems related to organizational changes.

The other type of overconfidence bias relates to the overestimation of one's own abilities in a particular domain (Healy and Moore 2007). For example, in a BPR context, this may lead to overestimate the weakness of a particular OM process the analyst feels more expert and confident with, while underestimate other critical factors which are actually more relevant to the company.

Accordingly, when the "group" decision is made by one or few over-confident individuals, this worsens the already negative effect of groupthink concurrence-seeking behavior: not just lack of constructive discussion behind it, but also high likelihood of over-confidence-related bias. We thus state the following hypothesis:

HYPOTHESIS 2B. *In group project-decision processes, members' over-confidence positively moderates* (*amplifies*) *the adverse effect of groupthink behavior on project performance.*

The third personal trait we are considering here, conscientiousness, consists of six facets (Costa et al. 1991): competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Conscientious people have been found to outperform those lower in conscientiousness across a variety of job types (Barrick and Mount 1991, Schmidt and Hunter 1992).

In a groupthink context, if the person or the few individuals that are making the "group" decision are conscientious, they will feel responsible for the group project's final performance, also as a form of accomplishing the perceived obligations to their group (Bendoly et al. 2010b) and will try fulfilling their sense of responsibility. Conscientious people usually perform better than others, so we expect that when GTB is present, if the few people making the "group" decision are conscientious, then the negative effects coming from the lack of constructive discussion will be dampened. Accordingly, we propose the following hypothesis:

HYPOTHESIS 2C. *In group project-decision processes, members' sense of conscientiousness negatively moderates* (*weakens*) *the adverse effect of groupthink behavior on project performance.*

3.2. Groupthink Behavior and Performance: The Moderating Effect of Group Members' Interpersonal Ties

It is well known that in a business context inter-firm relationships impact emerging network performance (Riccobono et al. 2014). Similarly, in group-project settings interpersonal relationships impact project performance. With regard to the groupthink literature, interpersonal ties are often analyzed in the form of group cohesiveness, which, in turn, is operationalized as the level of previous relationships and

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interpersonal evaluations among members. Furthermore, interpersonal ties have been considered the principal cause of GTB. However, the empirical literature testing this relationship reports controversial results. Studies found either no relationship (Flowers 1977, Fodor and Smith 1982), or a negative relationship (Leana 1985), or limited support for a positive relationship under certain conditions (Callaway and Esser 1984, Courtright 1978, Moorhead and Montanari 1986, Turner et al. 1992). We wish to contribute to this debate by exploring a different role played by interpersonal ties in the groupthink model. In particular, we do not hypothesize that previous relationships and interpersonal evaluations are antecedents of GTB (similar to group cohesiveness in the Janis and Mann model, 1977), but that they influence the negative effects of GTB on project performance.

In fact, some studies have also explored the direct link between interpersonal ties and performance. Even this relationship is not so clear; for example, Gully et al. (1995) showed evidence that it is influenced by moderating variables such as group norms or objectives. Interpersonal cohesiveness might enhance performance for groups with norms that encourage openness, playfulness, and disagreement, but might actually detract performance for groups with norms leading to conformity or agreement. Anyhow, members who experienced previous relationships among themselves will be more likely inclined to distraction (Lott and Lott 1965) and free-riding (Olson 1965) because they experience a feel of relax and confidence within the group and in turn perceive project pressure to be relatively low. According to the Social Loafing Theory (Williams et al. 1981), free-riding induces group members to exert less effort than it would be optimal. As a consequence we argue that having a high level of previous relationships within the group will exacerbate the negative impact of GTB on project performance because the decision will lack of constructive discussion and will suffer of poor commitment and effort spent by the member of the few members who are actually making the "group" decision. In line with these arguments we propose the following hypothesis:

Hypothesis 3a. *In group project-decision processes, the level of previous relationships among group members positively moderates* (*amplifies*) *the adverse effect of groupthink behavior on project performance.*

Group members' interpersonal evaluation is the basis of how people, either positively or negatively, consider interpersonal dialogs, and confront and connect with other group members (Huckman et al. 2009, Karni and Kaner 2008). Despite this positive consideration about inter-personal evaluation, some studies demonstrate that peer ratings of individual members' contributions are likely to be lower in high performing teams (Brown et al. 1990).

However, high inter-rating evaluations among group members are signal that members perceive that their colleagues provide a valuable contribution to group achievements. High level of evaluation corresponds to high capacity and commitment to the project. So, if the level of interpersonal evaluation within the group is high, we expect that when GTB is present, if the few people making the "group" decision are highly evaluated by their group members, then the negative effects coming from the lack of constructive discussion will be dampened. Accordingly, we propose the following hypothesis:

Hypothesis 3b. *In group project-decision processes, the level of interpersonal evaluation among group members negatively moderates* (*weakens*) *the adverse effect of groupthink behavior on project performance.*

4. Research Method

4.1. Research Setting, Sample and Data

To test our hypotheses we conducted a longitudinal controlled experiment across a 3-month project time frame (October–December 2013) involving 71 first-year MBA students (60.6% male, 23.7 years old on average) that had to carry out a business process re-engineering (BPR) project as part of the BPM 9-ECTS class, at a large Italian university. The students were grouped into 18 groups of four members each, except one group consisting of three members.

The BPR projects have been conducted as part of the BPM course since it began more than 10 years ago. The average workload required for the BPR project is 500 hours/group and the project final score counts for 60% of the final grade for this class. Project teams have to select a real company and conduct a real BPR project, as if they were actual BPM consultants. The BPM teacher provides the project schedule through a dedicated web site that contains also information about milestones, deliverables, and deadlines. Moreover, two meetings with the teacher are planned at two mid-project time points to provide feedback on on-going project work. During the same semester, the students were simultaneously attending three or four other classes of the MBA program and all of them had already worked in groups (in other classes), but none of them had conducted a BPR project until then. Consequently, a certain level of stress was contextual to the BPR group-project, providing us with a provocative situational context where social factors become critical and groupthink behavior in group-project decision-making processes is likely.

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Table 1 Data Collection Protocol

Constructs	Dimensions	Methods	Time points
Groupthink behavior	Concurrence-seeking behavior	Laboratory experiment	Mid-project_1 Mid-project_2 Project-end
Group members' personal traits	Perceived control	Survey to students	Mid-project_1
	Confidence	Laboratory experiment	Mid-project_2
	Conscientiousness	Survey to students	Project-end
Group members' interpersonal ties	Previous relationships	Survey to students	Project-start
	Interpersonal evaluations	Survey to students	Mid-project_1 Mid-project_2 Project-end
Project performance	/	Teacher evaluations	Mid-project_1 Mid-project_2 Project-end
Group characteristics (controls):	Gender homogeneity	Survey to students	Project-start
	Home-town homogeneity	Survey to students	Project-start
	Average bachelor degree final grade	Survey to students	Project-start
	Perceived project difficulty	Survey to students	Mid-project_1 Mid-project_2 Project-end

All the BPR projects follow the same protocol. Basically, each team of students has to select a real-world company and conduct a number of interviews and visits to collect data on the company's history, its organizational structure and number of employees, manufactured or marketed products, sales, market position, key competitors, customers, and suppliers. Also, the team must describe the company's main business processes by using the Value Chain model (Porter 1985). Afterward, together with the company contact person (she/he has to be in a managerial position), the team identifies a problem the company needs to solve or some business aspects the company wants to improve (i.e., the project idea). Starting from this, the team selects a specific business process that is relevant for the project idea, and from now on this business process becomes the object of the BPR project. The team uses all the BRP techniques learnt in class (for instance, process functional mapping, process flow modeling, analysis, and simulation, reengineering best practices, benchmarking analysis) to deeply understand the business process in its AS-IS version and to design the TO-BE configuration in respect to the identified criticalities and to the initial project idea and goals. During the project, the team meets the teacher for a check on the progress of work and presents its proposals to the company contact person to get feedback and improve its solution. Finally, the team compares the AS-IS and TO-BE configurations in terms of Key Performance Indicators (KPI) improvements. There are no limitations in the choice of the company (it can be a manufacturing company but also a bank, a hospital, a dot.com, a public administration) and in the choice of the business process under study (e.g., customer order management, inventory management, final product assembly process, supplier selection process, patient care process).

To collect research-data, we set a protocol that individualizes *what* (constructs), *how* (dimensions and methods) and *when* (time points) data has to be collected. Table 1 provides an overview of this protocol. Note that we use different methods to collect data, namely surveys to students, evaluations by the teacher, and laboratory experiments. The timing of data collection (project-start, mid-project_1, mid-project_2, and project-end) captures critical milestones of the project life cycle. The $project-start$ point corresponds to the end of a preliminary phase in which the groups are set-up and are ready to actively work on the project. Between $project-start$ and $mid-project_1$ time points, the groups already have to make critical decisions regarding the project (e.g., select the company, propose a project idea, identify the process to be modeled and analyzed) and perform professional and time consuming activities (e.g., meet company managers, make interviews with them, design the company's value chain and supply chain) and receive the first feedback from the teacher. Between $mid-project_1$ and $mid-project_2$ time points, the groups still make important decisions (e.g., design a plan of attack, choose the performance indicators to be improved, identify the areas of improvement) and perform further professional and time consuming activities (e.g., conduct additional interviews, map the selected business process, design the process flow diagrams, collect data from the company, make statistical analyses), and receive the second feedback from the teacher. Between $mid-project_2$ and $project-end$ time points, the groups make the last set of project decisions (e.g., decide what best practices need to be

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used for achieving some improvements, choose the technology to be implemented, select what statistical method is better to use to demonstrate the obtained advantages in the BPR), perform another set of professional and time consuming activities (design the TO-BE configuration of the process, conduct statistical analyses), and work on writing and presentation activities (writing the BPR project final report and preparing the slides for presentation in front of the class).

The multiple time points and multiple data collection methods allowed us to overcome the issue that data concerning individual and interpersonal dynamics tend to be extremely biased when gathered retrospectively and only reflecting perceptions (Huber and Power 1985, Menneer 1978). For example, if we had collected data at the end of the project, it would have been highly likely that both the evolution of group dynamics and the project final grade would have biased individuals in their assessments of interpersonal ties with group members.

Table 2 provides an overview of the companies involved in the BPR projects (in terms of company's industrial sector, main product/service, and size), and of the business processes selected by each group for re-engineering.

Table 3 provides more details about two projects in terms of business process criticalities identified, actions undertaken, and KPIs used.

4.2. Measures

4.2.1. Groupthink Behavior (GTB). Despite the great amount of literature that exists (Glaser 1993, Montanari and Moorhead 1989, Moorhead and Montanari 1982, 1986, Richardson 1994) measuring the groupthink symptoms of the groupthink model (Janis and Mann 1977), no study provides a measurement of *GTB* as a concurrence-seeking behavior. In our research, we start from the Janis (1982) definition of groupthink as "*a mode of thinking that people engage in when members striving for unanimity override their motivation to realistically appraised alternative courses of*

Table 2 Business Process Reengineering Projects under Analysis

	Company's industry sector	Company main product/service	Firm size [FTE]	Selected business process
Team 1	Health-care services	Organ transplantation and advanced specialized therapies services	805	Supplier accounts payable process
Team 2	Wholesale trade	Wholesale of food and beverage and house-hold products	29	Customer order management
Team 3	Plastic manufacturing and engineering services	Production of pipes and fittings in PVC and HDPE, which are used for conveying and distributing liquid foodstuffs, drinking water, and gas fuels. Also, technical services to support the pipelines' installation.	18	Inventory management
Team 4	Postal services	Inbound and outbound logistic services for postal products	295	Mechanized sorting process of priority postal products to be delivered by 3 days from the day of reception and registration by the postal center
Team 5	Agro-food	Essential oils, juices, flavored pastas, brine peel and dried peel related to: lemon, oranges, and mandarins	50	Inventory management of products for packaging
Team 6	Public administration	Assistance services for needy students (e.g., scholarships, accommodations, meals)	111	Delivery of scholarships to needy students
Team 7	Health-care services	Public hospital services (care, diagnosis, surgery, therapy, monitoring, etc.)	2,943	Delivery of first-cycle therapy to discharged patients of gynecology and obstetrics
Team 8	Agro food	Production of *Panettone* (typical Italian cake)	64	Inbound logistic
Team 9	Health-care services	Private hospital (diagnosis and therapy)	38,063	Patient management in day-hospital radiology
Team 10	Health-care services	Public hospital services (care, diagnosis, surgery, therapy, monitoring, etc.)	2,943	Inbound and outbound logistics in the hospital drugs warehouse
Team 11	Wholesale trade	Wholesale of beef, pork, and ovine meet	4	Inventory management
Team 12	Public administration	Assistance services for business financing and start-up companies	190	Delivery of financial support to companies for internationalization purposes
Team 13	Education (university library)	Typical library services	10	Book delivery
Team 14	Transportation	Car rental	18	Rental process
Team 15	Agro-food	Production of ice-cream	20	Inventory management
Team 16	Mining and manufacturing	Marble mining and manufacturing	90	Inventory management of finished products
Team 17	Manufacturing	Marble and stone-based products for building furniture	n.a.	Raw materials (marble and stone) procurement
Team 18	Manufacturing	Red and white wine manufacturing	16	Raw material (grapes) inbound logistics

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Table 3 Business Process Reengineering Projects: Examples of Selected Processes, Identified Criticalities, Undertaken Actions, Used Key Performance Indicators (KPIs)

	Team 1	Team 2
Selected business process	Supplier accounts payable process	Customer order management (COM)
Identified business process criticalities	Fraud risk in the payment of invoices to suppliers by accounting and finance operators (AFO). In particular: • AFO can edit the transportation document (TD) • AFO perform a manual procedure for invoice, called "out-batch" procedure, for international suppliers • Administrative Director (AD) is not efficient in controlling critical invoices to be approved	• Long time spent by operators in acquiring order references in customer telephone calls • Difficulties in understanding the specific products requested by the customer as listed in the customer order list • Products in the customer order listed randomly and not by department • Backlogs due to the fact that the supervisor does not alert the customer when a product is not available but there are similar products available
Undertaken actions	• Avoid the possibility to modify the TD in the Information System (IS) • Automate the payment procedure for international suppliers as it is for national ones by using an *ad hoc* add-on in the IS • Specialize AFO through creating different account in the IS with different task-access • Add a fraud detection and control procedure through an *ad hoc* add-on of the IS	• Reduce the number of telephone orders by integrating the existing website with an e-commerce application for on-line order • Ensure within the e-commerce website the "alternative product proposal" in case a specific requested product is (or may be) stocked out but there is a similar product available • Add the possibility for the customer to pick-up its order at the wholesaler location
Used KPIs	• Number of "out-batch" invoices • Time spent by the AD in controlling critical invoices • Usage level of AD resource	• Maximum number of manageable orders daily • Loss of revenues for not proposing alternatives for a specific stocked out product • % of backlogs

action." It means that the groupthink behavior exists when group members show a high level of consensus and satisfaction about the final group decision even if such a decision is quite different from their own original opinion.

We developed a method to measure concurrence-seeking behavior in a laboratory experiment, responding to the methodological challenges to catch groupthink in action (Hällgren 2010). To this purpose, we submit three decisional tasks (respectively, in mid-project_1, mid-project_2, and project-end time points) to group members. Students had to first perform the decisional tasks separately from the other members, and then together. Each decisional task consists in selecting two options out of eight alternatives to a given and well-described business problem. Also, each student has to provide a detailed motivation for her/his decision. In this way, we avoid bias due to a superficial decision and make each member build her/his own structured opinion. After the group makes its decision, each member, separately from the others, has to indicate how much she/he is satisfied with her/his group's final decision in a range from 1 (very strongly disagree) to 5 (very strongly agree). We calculate the *GTB* of each member by multiplying the discrepancy between the individual and the group choices (0 if both the two individually chosen options are equal to those of the group, 1 if just one, 2 if both are different) and the level of satisfaction he/she declares about the final group choices. We calculate the *GTB* of the group as the average of its members' *GTB*. In fact, we intentionally designed the three decision tasks in a way that a "correct" solution does not exist. This means that, when the individual is very satisfied about the final decision made by the group (this decision being quite different from the one she/he had initially made), this indicates her/his tendency toward GTB. Indeed, her/his consensus cannot be due to a real superiority of the final group solution but just to GTB.

The three decision tasks are different in content. The first decision, at mid-project 1, regarded the choice of two out of eight posters to be used by a travel agency for advertising purposes; each poster was evocative of a typical holiday location. In the second decision task, at mid-project 2, groups were asked to select two out of eight industry sectors where their fictitious companies should invest to increase the probability to obtain government funds; sectors vary from food and beverage, to construction, automotive, etc. In the third decision task, at project-end, groups were called from the CEO of a fictitious automotive company to re-organize two out of eight business functions to improve the business performance; the students have to select the two functions that they think are most strategic for the success of the initiative.

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Also, even if different in content, the three decisional tasks were designed according to the characteristics suggested by Esser (1998) for the "ideal decision task for groupthink research." First, they are "important" because the final decision would determine the success or not of a given initiative. For example, students were asked to select the right solution for a given consultancy problem under the assumption that this choice would surely determine the success of the initiative. Furthermore, the tasks are "difficult" because there is not enough time for an adequate search of data and analysis to inform the decision. Finally, tasks are "involving" since the students are supposed to have a relevant and crucial role for the final success of the imagined context (e.g., they were asked to act as if their advice was required directly from the firm's CEO to improve the firm business performance). Second, as requested by Esser (1998), subjects possess the knowledge and technical skills required for the decision; in fact, the decisional tasks are designed around the competences (i.e., knowledge about basic marketing processes, industry characteristics, and BPM) that the students already possess.

4.2.2. Group Members' Personal Traits. We adopt the same approach as Bendoly et al. (2010b) for measuring the three personal traits considered in our research model (see Appendix A).

To measure *perceived control* we use the six items indicated by Goldberg (1992). Of these, three directly measure the perception of personal/internal control (e.g., "My own efforts and my actions are what will determine my results"; see Appendix A); the other three measure the reversed concept (e.g., "Luck, other people and events control most of what I do"; see Appendix A). We calculated the *perceived control* of a group as the average of the *perceived control* among its members.

To measure individual *confidence* we used the technique suggested by Cesarini et al. (2006). Each subject was asked to provide a best guess in terms of mean value, as well as 90% confidence intervals (providing lower and upper bounds) on their guesses for each of 10 questions regarding business-related and general knowledge. We shifted the USA context-related questions used by Bendoly et al. (2010b) to the European context (see Appendix A). As consistent with the technique, these questions were chosen to represent issues familiar to the subjects and for which they could reasonably estimate a 90% confidence interval, yet whose precise values would typically not be known at the time of response. After providing their estimates, subjects were asked to estimate the number of questions for which the true answer falls within their reported range and the number of true answers provided by their peers. We assess individual *confidence* as the ratio between their perception of their own accuracy and their declaration of the accuracy of others. We consider the *confidence* of a group as the mean of the *confidence* over its members.

Finally, to measure *conscientiousness* we used seven items as in Goldberg (1992). Subjects were asked to indicate how much they agree that each item was descriptive of their personality. Items included "Organized vs. Disorganized," "Responsible vs. Irresponsible," etc. (see Appendix A). We consider the *conscientiousness* of a group as the mean of the *conscientiousness* of its members.

4.2.3. Group Members' Interpersonal Ties. To measure the intensity of group member's *previous relationships*, each group member was asked to indicate whether—at the date of commencement of the BPR project—prior social relations existed with each other member of her/his BPR group, related to either the personal (e.g., friends) or the professional sphere (e.g., colleagues) (see Appendix A). Then, in the case they indicate "yes" in one or both of the two fields, they are also asked to indicate the intensity of this relationship by choosing among five different levels. We calculate for each group member the level of *previous relationships* as the average of the intensities of private and professional past experiences with the other members. We assess *previous relationships* at group-level by calculating the average of the values of the members. Such a measure has also been used by other studies as a measure of cohesiveness both on the friendship (Flowers 1977) and past work experiences dimensions (Leana 1985, Moorhead and Montanari 1986). *Previous relationships* are measured once at project-start.

To measure the *interpersonal evaluation* among group members each member was asked to judges her/his relationship with each other member both from a personal and a professional point of view (see Appendix A). Items included "the extent you judge strong the harmony with the above colleague on a human level (e.g., tuning, sympathy, etc.)" and "the extent you judge strong the harmony with the above colleague on a professional level (e.g., useful discussions to solve problems related to the project, etc.)." We calculate *interpersonal evaluation* at group-level as the average among its members. Such a measure has also been used by other studies as a measure of "group harmony" (Lun and Bond 2006).

4.2.4. Group Project Performance. The measurement of the dependent variable of our model was based on the project scores assigned by the teacher, which followed the Italian universities' grading system ranging from 18 up to 30 cum laude. During the

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last 10 years, the teacher has developed a well-structured assessment method based on a number of items that the students were made aware of since the beginning of the class. In particular, the teacher assesses group project performance and assigns grades to it in each of the three project time points, mid-project_1, mid-project_2, project-end according to the rubric reported in Appendix B. In the three time points, the teacher assesses the quality of the BPR project based on different aspects related to the quality of the decisions made by the groups (see Appendix B). Some of them are more strategic (e.g., how good is the group's choice about which process to redesign given the KPIs) and some others are more operational (e.g., how appropriate is the group's choice about the level of details showed in their business process map based on the project idea). Given that these projects are part of a university course and the research studies the performance of these projects, to limit some potential bias in group performance measurement introduced by possible confounding between teaching the course and conducting the research, we completely separated the data collection activities related to dependent and independent variables. While the teacher assessed the performance measure, all the remaining data related to the other variables of the conceptual model were collected by an independent researcher, who directly conducted the three-rounds of surveys and laboratories, and elaborated the related measures and built the final dataset at the end of the project after teacher evaluations.

4.2.5. Controls. To clearly control for other factors influencing project performance, we introduce in our model the following control variables. We consider the group *bachelor degree final grade* calculated as the average among the bachelor degree score of all members constituting the group (Williams and O'Reilly 1998). We control for both group *gender homogeneity* and group *home-town homogeneity*. We calculate group *gender homogeneity* as the ratio between the number of members with the most frequent gender in the group and the total number of group members. *Home-town homogeneity* is calculated as the ratio between the number of members coming from the most frequent home-town in the group and the total number of group members. We control for *project difficulty* by asking group members to indicate how they perceived the BPM project's difficulty and by calculating the average among the provided perceptions. Finally, we control for the *time of observation* effects by measuring mid-project_1 as 1, mid-project_2 as 2, and project-end as 3.

5. Analysis and Results

Descriptive statistics are reported in Table 4. The comparative fit indexes of the confirmatory factor analyses show better fit-levels for multi-item constructs, if not considering items with lowest or none explanatory power with respect to their respective latent variable. Indeed, goodness-of-fit indicators improve without considering the item "If the BPR project succeeds it will be because of my efforts" and "The BPR project effectiveness is mostly in the hands of other people" for the construct *perceived control*, and the item "Thrifty" for the construct *conscientiousness*. In particular, the minimum Tucker-Lewis Index shifts from 0.71 to 0.87, the minimum comparative fit index from 0.76 to 0.90, and maximum root mean square error of approximation from 0.09 to 0.07. Accordingly, the final multi-item scales used at the individual level of analysis show sufficient levels of construct validity. *Conscientiousness* holds an alpha equal to 0.66 while *perceived control* equal to 0.64.

To test our hypotheses, we used a hierarchical linear model (HLM) because of the longitudinal and hierarchically nested nature of the data (Raudenbush et al. 2004). Indeed we collected data over three time points. Due to this reason, we initially had repeated measures of the same variables in our dataset. We therefore clustered those measures, collected at different time points, according to the BPR group they belong to. In sum, we built a hierarchical data

Table 4 Descriptive Statistics and Correlations

Variables (n = 38)	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Group project performance	27.15	2.27											
2. Groupthink behavior	3.66	1.53	−0.02										
3. Perceived control	3.68	0.27	0.55	0.01									
4. Confidence	0.92	0.24	0.36	0.14	0.30								
5. Conscientiousness	4.09	0.16	−0.02	0.03	−0.20	0.11							
6. Previous relationships	2.62	0.94	0.14	0.25	0.19	−0.12	−0.34						
7. Interpersonal evaluation	3.63	0.32	−0.06	0.43	0.02	0.12	0.03	0.31					
8. Bachelor degree final grade	100.7	4.79	0.30	0.08	0.41	−0.19	−0.29	0.49	0.02				
9. Gender homogeneity	0.76	0.20	0.07	0.17	0.25	0.05	−0.001	0.51	0.20	0.41			
10. Home-town homogeneity	0.47	0.41	−0.13	−0.04	0.08	0.06	−0.03	0.29	0.07	−0.07	0.49		
11. Project difficulty	3.48	0.58	0.09	−0.07	0.25	0.25	−0.28	0.17	0.02	0.21	0.16	0.21	
12. Time of observation	/	/	0.32	0.14	0.24	0.28	−0.10	−0.02	−0.12	0.10	−0.005	−0.07	0.61

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Table 5 Paired Samples *t*-tests

	Paired differences						
				95% CI of the diff.			
Variable	Pair	Mean	SD	Lower	Upper	*t*	Sig. (2−tailed)
GTB	mid-project_1 mid-project_2	−0.012	2.228	−2.073	2.049	−0.014	0.989
	mid-project_2 project-end	−0.765	1.917	−2.053	0.522	−1.324	0.215
Perceived control	mid-project_1 mid-project_2	−0.04	0.337	−0.357	0.267	−0.353	0.736
	mid-project_2 project-end	−0.083	0.147	−0.182	0.016	−1.877	0.090
Confidence	mid-project_1 mid-project_2	0.017	0.192	−0.161	0.194	0.232	0.824
	mid-project_2 project-end	−0.093	0.299	−0.294	0.108	−1.027	0.329
Conscientiousness	mid-project_1 mid-project_2	0.014	0.228	−0.197	0.225	0.161	0.877
	mid-project_2 project-end	0.001	0.144	−0.096	0.098	0.029	0.977
Interpersonal evaluation	mid-project_1 mid-project_2	0.204	0.506	−0.424	0.833	0.902	0.418
	mid-project_2 project-end	−0.004	0.226	−0.166	0.157	−0.058	0.955
Group project performance	mid-project_1 mid-project_2	−0.214	1.468	−1.572	1.143	−0.386	0.713
	mid-project_2 project-end	−1.076	1.438	−2.042	−0.109	−2.481	0.032
Project Difficulty	mid-project_1 mid-project_2	−0.738	0.480	−1.182	−0.294	−4.070	0.007
	mid-project_2 project-end	−0.114	0.323	−0.331	0.103	−1.166	0.271

structure for analyzing the longitudinal dimensions of data.

To assess possible differences in within-cluster measures (i.e., differences among the values of the same variables measured at different time points of collection) we carried out a *paired samples t-test* on the fourteen pairs of measures. The results of this test are reported in Table 5 and indicate that differences in measures are statistically significant only for *group project performance* (it increases between mid-project_2 and project-end, $p = 0.032$) and *project difficulty* (between mid-project_1 and mid-project_2, $p = 0.007$).

To check for the appropriateness of HLM, as suggested by Hofmann et al. (2000), we first run a variance component model to address the question whether there is sufficient variance within-clusters to justify the HLM approach. Thus, we first test the null model that had no predictors. The estimate of within-cluster variance is the ICC coefficient and is computed as the ratio of within-clusters variance over the total variance. We found that approximately 65% of the total variance in *group project performance* significantly resided within clusters (ICC = 0.65) thus justifying the choice of HLM.

Finally, although in each decisional task we designed eight possible choices to reduce the likelihood that too many members chose the same initial options, the random nature of the way by which people choose one option rather than another has the potential to bias the *GTB* measure if the initial decisions of group members are the same. For this reason, we conducted a robustness check by dropping those cases in which the majority of group members (3 or 4) selected the same initial decision. However, all results were confirmed using this reduced sample size.

Because our dependent variable (*group project performance*) is continuous, we used a mixed model linear regression. We used the same three-step procedure as in Combs et al. (2007), Song et al. (2014), and Trougakos et al. (2014) in which controls are first entered, then we introduced the main predictors, and finally the interaction terms between main predictors are added simultaneously. The HLM results of data analysis are reported in Table 6. Given that the last full model (Model 3) fits the data better than the other two (the Wald chi-squared increased from 38.71 to 203.18 with a $p < 0.001$), we follow the approach of Combs

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Table 6 Results of Hierarchical Linear Model Analysis Predicting *Group Project Performance*

Group project performance	Model 1	Model 2	Model 3
Control:			
Bachelor degree final grade	0.2408*	0.1651+	0.0131
Gender homogeneity	1.3084	−0.3265	0.7883
Home-town homogeneity	−2.1922**	−1.6273+	−3.0943***
Project difficulty	−1.5852**	−1.8597***	−1.6830***
Time of observation	1.1940***	1.2050***	1.3337***
Main predictors:			
Groupthink behavior		−0.1704+	−0.3796***
Perceived control		0.6594	1.9960**
Confidence		2.4455**	2.1189**
Conscientiousness		−0.4187	−0.2776
Previous relationships		0.8847*	1.1860*
Interpersonal evaluation		0.1920	0.8963+
Interaction terms:			
Groupthink behavior × Perceived control			1.3874**
Groupthink behavior × Confidence			−0.9247*
Groupthink behavior × Conscientiousness			1.8372***
Groupthink behavior × Previous relationships			−0.6449***
Groupthink behavior × Interpersonal evaluation			0.5106+
N	*N* = 38	*N* = 38	*N* = 38
Log likelihood	−68.9297	−62.1976	−54.5634
Wald chi-squared	38.71***	73.23***	203.18***
Pseudo R^2	0.4165	0.5186	0.6949

Pseudo R^2 estimates based on Kreft and de Leeuw (1998) and Singer (1998).
+$p < 0.1$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

et al. (2007), Tasa et al. (2011), and Song et al. (2014) and use Model 3 to test our hypotheses.

Results support Hypothesis 1, our literature-based premise that GTB has a negative impact on group-project performance ($r = -0.3796$, $p < 0.001$). Empirical results also provide statistical support for hypotheses Hypotheses 2a, 2b, and 2c. In fact, the significant positive interactions of GTB with both *perceived control* and *conscientiousness* ($r = 1.3874$, $p < 0.01$; $r = 1.8372$, $p < 0.001$, respectively) indicate that the presence of these two personal traits offsets the negative influence of GTB on group-project performance, thus supporting Hypotheses 2a and 2c. On the other side, the significant negative interaction of GTB with *confidence* ($r = -0.9247$, $p < 0.05$) reinforces such a negative relationship, thus supporting Hypothesis 2b.

Also interpersonal-ties-related hypotheses find empirical support. In particular, the negative interaction of GTB and *previous relationships* ($r = -0.6449$, $p < 0.001$) indicates that the presence of previous relationships among group members amplifies the negative influence of GTB, thus supporting Hypothesis 3a. On the other hand, even if only weakly significant ($r = 0.5106$, $p < 0.1$), the positive interaction between GTB and *interpersonal evaluation* lessens the negative effect of GTB on group-project performance; accordingly, Hypothesis 3b is partially supported.

Lastly, *home-town homogeneity* ($r = -3.0943$, $p < 0.001$), *project difficulty* ($r = -1.6830$, $p < 0.001$), and *time of observation* ($r = 1.3337$, $p < 0.001$) have a strong significant effect on group-project performance. Contrarily, *gender homogeneity* and *bachelor degree final grade* do not influence group performance.

6. Discussion and Conclusions

The purpose of this study was to investigate the role played by personal traits and inter-personal ties in moderating the negative impact of GTB on project performance. We collected and analyzed data over different milestone time points of a BPR project. Our findings provide support to the literature on groupthink, showing that principally groupthink concurrence-seeking behavior in groups' decision-making processes has a negative impact on project performance. Moreover, we found that a high level of perceived control and conscientiousness and, to a lesser degree, a high level of interpersonal evaluation among group members, counterbalance the negative impact of GTB on project performance. On the other side, grouping together over-confident members with high level of previous relationships enhances such a negative impact.

From the theoretical point of view, this study provides interesting contributions for the BOM, decision sciences, and organizational behavior streams of literature.

First, by finding empirical evidence that GTB does have a negative impact on BPR project performance, this study answers to the call of contemporary researchers (Ahmad and Schroeder 2003, Bendoly et al. 2006, Liden and Antonakis 2009) for exploring behavioral phenomena in operations management. Apart from few exceptions (e.g., Manz and Sims 1982), existing BOM literature, indeed, has overlooked group dynamics behavior in operations management and, in particular, GTB.

Second, this study fills a gap in the decision science literature on group decision making. We indeed explicitly consider in our model *concurrence-seeking* behavior. In fact, we designed an *ad hoc* laboratory setting to measure it. As already mentioned, existing empirical literature has dealt with the groupthink model (Janis and Mann 1977) without directly considering (measuring) the core construct of it: *concurrence-*

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seeking behavior (in other words, the actual GTB). Indeed, most studies (e.g., Chen et al. 2009) explored the linkages among antecedent conditions, symptoms and group decision outcomes without finding real confirmation of the existence of such a phenomenon. *Concurrence-seeking* is the distinctive behavior of the groupthink phenomenon and explains the meaning of groupthink itself, "thinking like the group."

Third, this research contributes to the organizational behavior literature on groupthink by adding new findings that can help responding to the still open debate on the consequences of concurrence-seeking behavior in terms of group performance. In line with the stream of research which goes beyond the model proposed by Janis and Mann (1977), we investigate different combinations of the constructs (Chen et al. 2009, Park 2000) and also add some new variables to the original groupthink model (e.g., Neck and Moorhead 1995). Our groupthink model reveals the presence of two new moderating factors that influence the effect of GTB on performance. Specifically we consider and explore the role of personal traits in group dynamics, and not just the role played by group characteristics such as collective efficacy (Whyte 1998). In this field, we also contribute to the literature on "overconfidence" asking for: "*When individuals view themselves as much more capable than others, are they really likely to be concerned with strengthening ties or are they more likely to pursue work on their own?*" (Bendoly et al. 2010b, p. 480). In particular, we provide evidence that over-confident people do not provide effective decision mechanisms within a group (we indeed found that *confidence* enhances the negative effect of GTB). However, we also found that *confidence* has a positive direct impact on performance which corroborates the common sense of "*self-confidence should be encouraged only to a limit*" (Bendoly et al. 2010b, p. 479). Regarding group *inter-personal ties*, we contribute to the debate about the relationship between groupthink symptoms and cohesiveness since we propose that this construct plays a different role in the GTB model. We indeed did not hypothesize that *previous relationships* and *interpersonal evaluations* are antecedents of GTB (similar to group cohesiveness in the Janis and Mann's model, 1977), but that they influence the effects of GTB on project performance. We found confirmation for this.

The results of this study allow offering managers some suggestions for ensuring effective performance in BPR projects and controlling for potential obstacles. First of all, this study alerts managers that in BPR projects, GTB has to be considered as a threat because it has a negative impact on project performance. Accordingly, managers in charge of BPR projects should consider the following practices suggested by Janis (1972) as remedies for this negative behavior: usage of a critical reviewer when making important group decisions; not allowing individuals to express their preferences in advance; consideration of all alternatives before making the final decisions and open sessions to reconsider alternatives; discussion of ideas with people outside of the group; invitation of experts to group meetings.

Moreover, our research adds to these remedies some useful suggestions about how to set and/or incentivize personal traits and interpersonal ties that weaken the negative effect of GTB. From one side, a manager should encourage individuals' understanding that they control (*perceived control*) and are responsible (*conscientiousness*) for project tasks and performance. This could be achieved, for example, by clearly sharing with the group the BPR project's work breakdown structure, indicating responsibilities and roles. Furthermore, managers should frame the members' perception of a debate with their peers as something pleasant, useful, and effective in making decisions and/or in solving problems related to the project. In other words, they are asked to increase the group members' *interpersonal evaluation*.

From the other side, managers should inhibit individual feelings that one member is more capable than others (*over-confidence*) and they should be well informed about past private and professional experiences of each individual with the others members (*previous relationships*). However, it is important to take into account that these two last characteristics might have a positive direct impact on overall project performance. Accordingly, we suggest the manager to evaluate, case by case, the possibility to adopt the appropriate remedies suggested by Janis to directly reduce GTB instead of just compensating its negative effect.

Finally, further managerial implications can be derived by looking at the results regarding the control variable *time of observation*. We found that *time of observation* has a strong significant and positive effect on project group performance. To comment this finding we also consider the results of the *paired samples t-tests*. We indeed found that project group performance does not show significant differences moving from mid-project_1 to mid-project_2, whereas it significantly increases between mid-project_2 and project-end. This is probably due to the fact that groups were aware since the beginning that the grade they got from the teacher on the project work mostly depended on the final report and final presentation. All the preliminary deliverables were, instead, been used by the teacher just to provide them feedback for improvement. Because reward-based tasks are more likely to be perceived as important and, indeed, students' effort and commitment increase when approaching the reward moment (Zenger 1992),

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consequently we observed that project group performance significantly increases but only in the last phases of the project. A manager should thus add reward-based mechanisms throughout the whole project life cycle, for example, in critical milestones, to increase the whole group project performance.

This research has several limitations although we controlled for many potential issues when collecting data and testing our hypotheses. Among them, the following ones surely merit to be mentioned. First, we did not provide students with real incentives related to the decision tasks in the GTB laboratories. In line with suggestions of Katok (2011), the only mechanism we adopted to ensure that participants took their decisions seriously was to ask their help with research and to give them a choice to opt out. Second, we did not apply our research to real business project settings but to a master students' BPR project. Third, project performance assessment, although based on a well-structured evaluation method, was mainly subjected to the teacher's personal evaluations. Fourth, although the controlled laboratory experiment allowed us to catch and measure the GTB in action (Hällgren 2010), our GTB measure is not context dependent, that is, it does not regard a project-related "group decision making" process.

This study offers further interesting stimuli for future studies. First, we investigated the presence of GTB in a BPR project context. Further research is needed to study GTB in other OM contexts in which activities and decisions are made by groups. Specific guidelines on running top management teams or project teams are available in the literature; contrarily, studies about management of operational teams have been rare (Lee et al. 2013). The examples reported in section 2 of this study show anecdotal evidence that GTB exists, for example, in production teams and quality circles, but also in new product/process development teams. Does it also exist in further OM contexts such as six-sigma improvement teams or other operational manufacturing and service teams? Incidentally, one should explore if GTB is more likely to appear in temporary (project-like) vs. permanent (colleague-like) teams, or the opposite.

Furthermore, surely more research effort has to be directed not just in understanding and/or predicting the causes of GTB but also on testing the effectiveness of possible remedies. Based on such research, new findings could provide team managers with effective mechanisms that avoid the existence or reduce negative group behavior. In this direction, future studies should investigate whether a structured group decision-making process (e.g., the adoption of a decisional protocol) reduces GTB or whether specific characteristics of the group leader and her/his relationship with group members moderate GTB.

Appendix A. Questionnaire

(the text in brackets and italics was not provided to participants)
Group Name: . . . . . .
Student Anonymous Number (raffled): . . . . . .
Please indicate the following personal information:

Gender: [] Female [] Male
Home-town (City, State, Country): . . . . . .
Bachelor degree final grade: . . . . . .

(CONSCIENTIOUSNESS)
Please indicate to what extent the following terms seem truthfully describe your activity in group work. For each item, please select one of the following response choices:
[] I do not agree at all; [] I do not agree; [] I do neither agree nor disagree; [] I agree; [] I very much agree

- Organized
- Responsible
- Conscientious
- Practical
- Thorough
- Hardworking
- Thrifty

(PERCEIVED CONTROL)
Please indicate to what extent you agree with the statements below. For each item, please select one of the following response choices:
[] I do not agree at all; [] I do not agree; [] I do neither agree nor disagree; [] I agree; [] I very much agree

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- My own efforts and actions are what will drive performance in the BPR group project work I am engaged in.
- What I did and how I did it will determine the success of the BPR group project work I engaged in.
- If the BPR project succeeds it will be because of my efforts.
- The BPR group project work I engaged in is mainly controlled and directed by luck, other people, and external events.
- The BPR project effectiveness is mostly in the hands of other people.
- The BPR project performance is mostly controlled by external things.

(CONFIDENCE)
The following questions are designed to determine how confident you are of your own estimates relating to recent market and political activities. They are not designed to test your general knowledge. Please answer to the following questions by providing your best estimate. Then, please also provide a 90% confidence interval around your guess. For example, if the question is:

"What was the population of Italy in 2000 (in millions)?"

If you think that it was around 57 million, but you are 90% sure that the real value falls between 40 million and 70 million. . . your response should be:

57 [40, 70]

In other words, for each question, please provide a "mean" estimate as well as the upper and lower bounds on what is your own 90% confidence interval around that estimate in the form: *Mean [LowerBound, UpperBound]*

1. How many people were resident in Italy on January 1, 2011 ?
2. What was the Gross Domestic Product (GDP) in Italy (€ million) in 2005?
3. What were the profits (in millions of $) of General Motors for the year 1999?
4. How much did it cost (in millions of dollars) a Boeing 747-300 in 1982?
5. How many factories had Fiat in North America on the January 1, 2010?
6. In what year did Ireland become part of the European Union?
7. What was the public Italian debt (in millions €) in 2008?
8. How many centers of research and development had Fiat in Italy on the January 1, 2010?
9. What was the turnover (in millions €) of Barilla for the year 2008?
10. What was the market value (in millions of dollars) of Ford Motor in 1990?

Look back at your answers on the above 10 questions.
Looking back on the intervals (ranges) that you specified above, how many of them do you believe contain the true value asked for by their associated questions (a number, 0–10)

. . ..

All participants in this study receive the same instructions as you do. On average, how many of their intervals (ranges) do you believe contain the true value? (some value between 0 and 10).

. . ..

(PREVIOUS RELATIONSHIP)
(*Each group member has the list Student Name/Student Anonymous Number and uses this list when compiling this section. The part of the questionnaire related to PREVIOUS RELATIONSHIP and INTERPERSONAL EVALUATION was repeated three times to allow peer-members assessment*)

Please indicate the Student Anonymous Number your answers are related to: . . ..

Please indicate whether there exist prior social relations with the indicated member, related to your personal and private life (e.g., friend, etc.): [] YES [] NO

If yes, please indicate the frequency of such kind of relationship:
[] Absolutely not frequent; [] Not frequent; [] Neither not frequent nor frequent; [] Frequent; [] Very frequent

Please indicate whether there exist prior social relations with the indicated member, related to your professional life (e.g., fellow students, colleagues, etc.): [] YES [] NO

If yes, please indicate the frequency of such kind of relationship:
[] Absolutely not frequent; [] Not frequent; [] Neither not frequent nor frequent; [] Frequent; [] Very frequent

(INTERPERSONAL EVALUATION)
Please indicate the Student Anonymous Number your answers are related to: . . ..

Please Cite this article in press as: Riccobono, F., et al. Groupthink and Project Performance: The Influence of Personal Traits and Interpersonal Ties. *Production and Operations Management* (2015), doi 10.1111/poms.12431

Please indicate how you judge the harmony with the indicated member, on a human level (tuning, sympathy, etc.):

[] Absolutely weak; [] Weak; [] Neither weak nor strong; [] Strong; [] Very strong

Please indicate how you judge the harmony with the indicated member, on a professional level (debate useful and effective in making decisions and/or solve problems related to the project, etc.):

[] Absolutely weak; [] Weak; [] Neither weak nor strong; [] Strong; [] Very strong

(PROJECT DIFFICULTY)

Please complete the sentence below:

So far I find the BPR project. . .. . .

[] Absolutely easy; [] Easy; [] Neither easy nor difficult; [] Somewhat difficult; [] Very difficult

Appendix B. Project Group Performance Grading Rubric

(All the item below are evaluated in a scale that follows the Italian universities' grading system ranging from 18 up to 30 *cum laude*)

(Grading Rubric at mid-project_1)

- Deliverables (1, 2, and 3) have been completed in time (within scheduled deadlines) and adhere to the given templates (they respect both the format, the length, and all the requested contents);
- Project idea (motivation, evidence of a real problem, project goal, relevance for business performance);
- Plan of Attack (coherence with the project idea);
- Description of the general characteristics of the company (brief history, organizational structure and number of employees, products manufactured or marketed, sales, market position, key competitors). Identification of the company's main customers and suppliers;
- Description of main company's business processes: the team is required to use the Value Chain model to classify company's processes;
- Discussion and overview about the specific process that the team has chosen to study, and also about the technology or system that the company uses to support that process. The business process and system that supports it must be well discussed and supported by evidences, concrete examples (software name, type, vendor, and some screenshots) and process performance indicators.

(Grading Rubric at mid-project_2)

- Deliverable 4 has been completed in time (within scheduled deadline) and adheres to the given template (it respect both the format, the length, and all the requested contents);
- Modeling of the AS IS configuration of the business process through standard modeling techniques IDEF0 and BPMN;
- Modeling of the Information System supporting the business process through the standard modeling technique UML;
- Quantitative business process flow analysis through discrete-event simulation (students use ARENA simulation package);
- Discussion of the points of strength and weakness of the process, analysis of criticalities.

(Grading Rubric at end-project)

- Deliverable 5 (Final Report) has been completed in time (within scheduled deadlines) and adheres to the given template (it respects both the format, the length, and all the requested contents);
- Modeling of the TO-BE configuration of the business process through standard modeling techniques IDEF0 and BPMN;
- Modeling of the Information System supporting the reengineered business process through the standard modeling technique UML;
- Quantitative business process flow analysis of the reengineered business process through discrete-event simulation (students use ARENA simulation package);
- Discussion of business process improvement in respect to the identified criticalities and to the initial project idea and goals; alignment with the company's KPI;
- Oral presentation of the whole project group work.

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