The Effects of Multi-Level Group Identification on Intergroup Cooperation and Performance

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ABSTRACT

We examine the effects of multi-level group identification on intergroup cooperation and performance. Using an experiment that manipulates individuals’ identification with a sub-group (immediate work-group) and a superordinate group (the organization in which that group is nested), we examine whether high or low identification affects individuals’ propensity to cooperate with another group and their subsequent task performance. Using theory from psychology, we predict and find that both high sub-group identifiers and high superordinate group identifiers cooperate more frequently than their low counterparts. Consistent with expectations, we find that these effects are driven by individuals’ perceived threats to group identity and also a greater concern for the larger collective. We find mixed evidence of a positive interactive effect of sub-group and superordinate group identification on individuals’ decisions to cooperate. Finally, we find that average performance on cooperative tasks is lower than average performance on non-cooperative tasks, suggesting a potential downside to cooperation. This effect is driven by the decision to cooperate and is exacerbated by high sub-group and/or high superordinate group identification, which further suggests that high levels of group identification may not always result in optimal outcomes. Results of our study highlight elements of intergroup dynamics that may impact the effectiveness of organizational design decisions. Our results also have implications for managers as they consider the need for performance evaluation, control, and incentive systems that measure and reward intergroup activity. Our results suggest that managers need to carefully consider the types of groups in the organization, as well as the likelihood that group members will identify with each group, as these factors can influence the effectiveness of controls and incentive systems.

Keywords: Groups; incentives; cooperation; performance
1. Introduction

In this paper, we examine the effects of multi-level group identification on intergroup cooperation and performance. We employ a setting in which one’s identification with both a sub-group (e.g., one’s immediate work-group) and a superordinate group (e.g., the organization in which the individual’s work-group is nested) are manipulated to investigate how identification with each of these groups affects an individual’s propensity to cooperate with another group, as well as the individual’s subsequent task performance. This issue is important because organizations are constructed in several layers of groups, and organizational outcomes likely depend on the interactions among these various groups. Moreover, intergroup interactions are shaped in part by the extent to which group members identify with each group. For example, an accounting professor’s behavior is affected by her identification with her department, school, and institution.

Prior research in managerial accounting has examined the effects of group identification or social norms in group or multi-agent work environments, including focusing on formal control systems (Coletti et al. 2005), team and report structure (Rowe 2004), the interaction of financial and social incentives (Brüggen and Moers 2007), and the effectiveness of mutual monitoring contracts (Towry 2003; Zhang 2008). We extend this literature in two important ways. First, while prior research primarily focuses on intragroup behavior (within a single group), we explore how the norms and valued outcomes of one’s multiple group identities influence intergroup behavior (between groups). Second, our outcomes of interest are intergroup cooperation and task performance conditional on a decision of whether or not to cooperate, two outcomes that have received scant attention in prior accounting research. As discussed later, both of these extensions have implications for organizational design, as well as for how performance is measured and
rewarded within an organization.

To formulate our predictions, we rely on Social Identity Theory (SIT). Central to SIT is the notion that individuals identify with groups to reduce uncertainty about their social environment (e.g., determine how they should act) and/or to pursue self-enhancement (Tajfel and Turner 1979; Turner al. 1987; Abrams and Hogg 1988; Hogg 2000, 2007). Wishing to establish and maintain a positive self-concept, individuals will seek to create positive distinctiveness for the groups with which they identify, actively fighting threats to these group identities. When no threat is perceived to the positive distinctiveness of the group, high identifiers may demonstrate otherwise counter-intuitive behavior such as favoritism toward another group, primarily to cast the group’s image in a positive light and/or to establish dependence from an outgroup (Hornsey and Hogg 2000b; Yzerbyt and Demoulin 2010).

Based on SIT we expect high sub-group identifiers to cooperate with other sub-groups more often than low sub-group identifiers, due to a desire to use cooperation to establish positive differentiation for their sub-group when there is no perceived threat to sub-group identity. We also expect high superordinate group identifiers to cooperate more often than low superordinate group identifiers, due to the notion that making the superordinate group more salient will highlight these individuals’ concerns for the larger collective of which they are a part, effectively turning inter(sub-)group interactions into intragroup interactions. Finally, because individuals who exhibit high identification with both their sub-group and superordinate group are likely to have both identities salient while making cooperative decisions, we expect a positive interactive effect between sub-group and superordinate group identification such that differences in cooperation between high and low sub-group identifiers will be magnified in the presence of high superordinate group identification.
We also examine how group identification and the decision to cooperate affect another important variable, task performance. Studies have found that high group identification can lead to higher motivation and task performance in some contexts (e.g., Hogg and Terry 2000; van Knippenberg 2000; Riketta 2005), but may also lead to increased competitiveness and lower task performance in others (e.g., Balliett et al. 2014). Furthermore, the decision to cooperate itself may cause differences in performance (Karau and Williams 1993). This highlights the importance of simultaneously studying identification, cooperation, and task performance.

We conduct an experiment to study the effects of multi-level group identification on intergroup cooperation and performance, manipulating between-participants both sub-group identification and superordinate group identification as either high or low. During the experiment, participants assume the role of workers completing a task as part of a group (the sub-group manipulation) nested within a company (the superordinate group manipulation). Participants complete multiple work periods in which they first work to benefit themselves and their sub-group, and then complete additional work after choosing to have that work benefit either: a) themselves alone, or b) themselves and another group within their company (i.e., cooperate), at a lower rate to the individual – but a higher payoff to the larger collective – than the first option.

Consistent with expectations, we find that high sub-group identifiers cooperate more often than low sub-group identifiers, and that this effect is mediated by individuals’ perceptions of (a lack of) competition with other sub-groups and a concern for the larger collective in which their sub-group is nested. Given that prior research shows that greater decentralization is likely to lead to higher levels of sub-group identification (Ashforth et al. 2008), our finding that high sub-group identifiers demonstrate the highest levels of cooperation suggests another benefit to
decentralization (Indjejikian and Matějka 2012).

Also consistent with expectations, we find that high superordinate group identifiers cooperate more often than low superordinate group identifiers, and that this effect is mediated by perceptions of competition with other sub-groups and a concern for the larger collective. Through appropriate communication and control strategies, firms may be able to affect individuals’ identification with different groups, and our finding for superordinate group identification suggests that firms may reap benefits from adopting communication strategies of a “one team” nature. However, it is important to note that any attempts to increase the salience of superordinate group identities in this manner must take care not to threaten sub-group identities, or such strategies may fail as individuals attempt to maintain sub-group differentiation.

We find mixed evidence of a positive interactive effect of sub-group and superordinate group identification on individuals’ decisions to cooperate with other sub-groups. In tests of hypotheses using models based on indicator variables for experimental conditions, we find no statistically significant support for an interactive effect. Conversely, in a generalized structural equation model (GSEM) using continuous factor scores for group identification, we find a direct effect of the interaction on individuals’ decisions to cooperate. This finding highlights the potential benefit of greater congruence between lower-level (sub-group) goals and higher-level (superordinate group) goals, and the need for appropriate evaluation, control, and compensation systems to measure and reward performance toward these goals while ensuring that higher-level goals do not threaten valued sub-group identities. For example, organizations may achieve sufficient intergroup outcomes without explicit incentives for that behavior, depending on the extent to which group members identify with both sub- and superordinate groups within the organization.
Finally, we find no differences in performance on non-cooperative tasks as a function of either sub-group or superordinate group identification. However, we do find that task performance for nearly all participants is lower when individuals choose to cooperate – or perhaps even when they know they will soon be cooperating – versus when they choose to work only for themselves. These findings underscore the importance of understanding the trade-offs that may exist when motivating increases in intergroup cooperation versus motivating maximum individual and intragroup task performance, as we highlight a potential downside to increased cooperation.

Collectively, our findings demonstrate the importance of understanding how team members perceive, identify with, and are affected by the different groups present in multi-level organizations. Such an understanding can help firms determine the best organizational hierarchy, develop appropriate communication and control strategies to foster group identification at appropriate levels, and establish evaluation and compensation systems that measure and reward performance along intergroup dimensions.

The remainder of this paper is organized as follows. The next section discusses relevant literature and develops our hypotheses. Section 3 describes the experimental research design, section 4 presents the results, and section 5 provides a summary and discussion.

2. Literature review and hypotheses

*Social Identity Theory and Group Identification*

Social Identity Theory (SIT) posits that an individual’s self-concept consists not only of idiosyncratic attitudes, beliefs, and resultant behaviors, but also the attitudes, beliefs, and
resultant behaviors of the groups with which that individual identifies (Tajfel and Turner 1979).\(^1\) To make sense of social environments, individuals categorize themselves and others based on group membership, drawing distinctions between members of a group with which they identify (an ingroup, or “us”) and others (outgroups, or “them”) (Turner et al. 1987).

SIT suggests that an individual’s cognitive system makes salient the category or categories that best fit the social context (Oakes 1987; Oakes and Turner 1990; Oakes et al. 1994). As the subjective importance of a particular categorization increases to an individual, the more the perspective of the individual shifts from the “me” toward the “we,” and the more likely it becomes that the individual perceives the categorization to be relevant in a wider variety of contexts. Group prototypes that stem from these categorizations are what help individuals make sense of their social world, reducing uncertainty about oneself, others, and how either party may be expected to behave in a particular social context (Turner et al. 1987; Ray et al. 2014).

Self-enhancement is also important in motivating group identification. SIT extends the principles of social comparison theory (Festinger 1954) to the collective level, suggesting that social identity and intergroup behavior are motivated, in part, by the pursuit of positive group distinctiveness (Turner 1975; Rubin and Hewstone 1998). As such, individuals seek to enhance their own self-concept through their identification with groups, particularly with those groups that allow them to make favorable comparisons with outgroups along dimensions considered to be relevant or important.

*Antecedents of Group Identification*

Research finds that certain group characteristics enhance individuals’ identification with

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\(^1\) Identification with a particular group generally encompasses three related, but separately identifiable dimensions: (1) a cognitive component – a knowledge of belonging, (2) an affective component - the emotional significance associated with group membership, and (3) an evaluative component - the value significance attached to group membership (Ellemers et al. 1999).
the group. For example, groups that have high levels of entitativity, cohesiveness, and member homogeneity typically foster greater levels of uncertainty reduction in individuals due to their relatively simple, clearly defined and differentiated, unambiguous group prototypes (Hogg 1993; Brewer and Harasty 1996; Hamilton and Sherman 1996). Group size may also affect identification in certain contexts, as individuals construct their social identities with a goal of balancing their need for inclusion with their need for differentiation (Brewer 1991). In organizational settings, additional group and individual factors that may be associated with an increase in identification include position/organization tenure, job level, participative leadership, skill variety, task autonomy, level of “challenge” in duties, and group goals and values that are congruent with an individual’s goals and values (Riketta 2005; Ashforth et al. 2008).

Given the self-enhancement motivation of group identification suggested by SIT, positive group distinctiveness can also have an effect on identification (Rubin and Hewstone 1998). As individuals attempt to construct a positive social identity, groups that have high positive distinctiveness relative to others will be more likely targets of identification, provided that group differences are perceived to be legitimate, rigid, and stable. Consistent with this notion, research finds that individuals have also exhibited higher levels of identification with such groups, as compared to groups of lower perceived distinctiveness (Ellemers et al. 1988, 1993).

**Consequences of Group Identification**

Much of the literature on group identification in organizational settings has focused on the positive consequences of increased identification. For example, research in psychology finds that high identifiers possess higher levels of intrinsic and overall motivation for their jobs, as well as increased perceptions of group goals and outcomes being tied to their own (Hogg and Terry 2000; Haslam 2001). Additional research finds that high identification leads to higher
contributions to group outcomes in public goods settings and may help solve other social
dilemmas (e.g., Brewer and Kramer 1986; Wit and Wilke 1992; Wit and Kerr 2002).

Research in accounting also finds that high identification with a team can result in
desirable behaviors. Specifically, research finds that high identification leads to greater
intragroup cooperation (Towry 2003), coordination (Bauer and Estep 2016), performance (Rowe
2004; Naranjo-Gil et al. 2012), and trust (Coletti et al. 2005), as well as decreased professional-
organizational identity conflict, employee turnover (Bamber and Iyer 2002), and leniency in
evaluating internal controls (Stefaniak et al. 2012). Research also notes some undesirable or
conflicting behavior that stems from high identification, such as impaired auditor objectivity
(Bamber and Iyer 2007; Bauer 2015). For example, Bauer (2015) finds that auditors who identify
more strongly with their clients acquiesce to the client-preferred accounting treatment, unless the
salience of their professional identity is highlighted. Related research in accounting focuses on
intragroup behavior, and we examine intergroup behavior. This difference is depicted in Figure
1.

(Figure 1)

Sub-Group Identification

Research in psychology examining intergroup behavior finds that intergroup interactions
tend to be more competitive and less cooperative than otherwise identical inter-individual
interactions (Wildschut et al. 2003; Dovidio and Gaertner 2010). SIT suggests that highly
identified individuals strive to achieve and maintain positive distinctiveness for their groups and,
as such, intergroup relations are often shaped by the presence or absence of perceived threats to
one’s group identity (Hornsey and Hogg 2000a, 2000c, 2002). Furthermore, research that
examines whether there is more or less cooperation toward an ingroup or an outgroup is mixed,
with some studies finding greater cooperation toward ingroup compared to outgroup members and other studies finding no difference (Balliet et al. 2014).

In our setting, these factors introduce the possibility that low sub-group identifiers will cooperate more often than high sub-group identifiers due to their perception of the opportunity to cooperate as being more of an inter-individual or an intragroup decision (depending on the extent to which they identify with their superordinate group), as compared to an intergroup decision. However, despite the notion that high identification generally leads to an increase in perceived competitiveness, as noted above, we do not expect our high sub-group identifiers to perceive significant threats to their sub-group identity due to a lack of explicit competition and the high implicit positive distinctiveness possessed by their group. Thus, we expect that highly identified individuals will attempt to further differentiate their group or cast it in a positive light (Mullen et al. 1992; Balliet et al. 2014) by choosing to cooperate. This leads to our first hypothesis:

**HYPOTHESIS 1.** High sub-group identifiers will exhibit more frequent intergroup cooperation than low sub-group identifiers.

*Superordinate Group Identification*

Individuals’ concern for the larger collective is a significant reason why individuals who identify highly with a superordinate group may cooperate with other sub-groups. A concern for the larger collective may be present at the sub-group level but becomes much more salient as the importance of the superordinate group identity increases to the individual. In addition to a concern for the larger collective, many of the reasons underlying why we expect high sub-group identifiers to cooperate more often than low sub-group identifiers are applicable to the superordinate group level. That is, high identification with one’s superordinate group will make it more likely that the individual considers the outcomes of the larger group to be of importance, as well as reducing perceptions of intergroup competition as the focal point of outcomes shifts
from separate sub-groups to one collective superordinate group. For those individuals who exhibit low identification with their sub-group, this combination essentially turns intergroup interactions into intragroup interactions, leading to higher levels of cooperation between groups. As such, our second hypothesis is:

HYPOTHESIS 2. High superordinate group identifiers will exhibit more frequent intergroup cooperation than low superordinate group identifiers.

Multiple Group Identities

Consistent with SIT, research in organizational identification has shown that one’s identification with a lower-level group, such as an immediate work-group, is separable from identification with the higher-level organization (Ashforth et al. 2008). This research also suggests that, in general, identification with a particular level of an organization correlates more strongly with behavior and outcomes aimed at that level (e.g., Ashforth and Johnson 2001; Ellemers and Rink 2005; Bartles et al. 2007; Ashforth et al. 2008). However, for situations involving intergroup considerations – e.g., between sub-groups nested within a superordinate group – the appropriate or focal level with regard to behavior and outcomes may not be immediately clear, and may depend on the extent to which the appropriate behavior and outcome for the situation differ with respect to the two group identities.

Organizations may be able to influence behavior and address these potential dilemmas, as efforts to align sub-group goals with superordinate group goals increase the likelihood that the identities for the two groups overlap to a significant extent for most individuals. Provided that an individual identifies with each group, overlap is likely to cause blurring of the two identities and/or create an effect of projection, wherein the individual may view the organization as the vehicle through which they can express their valued sub-group identity (Ashforth and Johnson 2001). This may increase the subjective importance of both identities to the individual, which
would make simultaneous salience more likely, a condition which prior research has shown to result in lower levels of ingroup bias and more positive evaluations of outgroup (other sub-group) members (Hornsey and Hogg 2000a, 2000b, 2000c).

In summary, we expect individuals in our setting who identify highly with both their sub-group and their superordinate group to: (1) be more likely to have both identities salient when presented with opportunities to cooperate with other sub-groups, and (2) experience overlap or blurring between these two identities due to the processes discussed above. We expect these factors, combined with a lack of perceived threat to their valued sub-group identity (as discussed in the development of H1), to result in individuals choosing higher levels of cooperation with other sub-groups. Thus, our final hypothesis is:

**HYPOTHESIS 3.** Differences in intergroup cooperation between low and high sub-group identifiers will be magnified in the presence of high superordinate group identification.

We summarize the predicted effects of sub-group identification and superordinate group identification on intergroup cooperation graphically in Figure 2, and summarize the theoretical process through which the effects are predicted to occur in Figure 3.

(Figure 2 and Figure 3)

**Group Identification, Cooperation, and Task Performance**

Research regarding the effect of group identification on task performance is mixed. Intrinsic motivation on collective tasks has been shown to be affected by one’s relatedness to others in the collective (Tauer and Harackiewicz 2004), and some research finds that groups containing high identifiers - due to a greater focus on group goals and outcomes - exhibit greater task performance than groups without such members (Hogg and Terry 2000; van Knippenberg 2000; Riketta 2005). However, other research finds that “too much” identification can result in
increased competitiveness and lower task performance (Wildschut et al. 2003; Balliet et al. 2014). The effect of group identification on task performance in our setting is therefore unclear, especially given that (cooperative) task performance may be viewed by some high sub-group identifiers as benefiting members of an outgroup, and thus potentially threatening one’s sub-group identity (van Knippenberg 2000).

The decision to cooperate *per se* may also affect task performance, as some research suggests that individuals may use “moral wiggle room” to act in their self-interest when they have conflicting motivations (Dana et al. 2007; Haisley and Weber 2010). This line of research suggests that individuals performing a kind, prosocial act may engage in more self-regarding subsequent behavior because they can internally justify that behavior. In the context of our setting, this suggests that individuals who choose to cooperate (a pro-social action) may end up working less (a selfish action).

Finally, theory suggests that individuals will exert more effort on tasks when the outcomes are highly valued, provided those outcomes are: (1) directly related to individual effort, and (2) that one’s individual effort is critical to obtaining the outcomes in question. Valued outcomes likely include objective factors like monetary rewards, as well as subjective outcomes like self-evaluation information and feelings of purpose with regard to one’s group memberships, which suggests that effort choices are likely affected by the relative importance of the task to one’s self and others within their valued group (Karau and Williams 1993). In our groups setting, this theory would then suggest that performance on cooperative tasks - that benefit one’s self and another sub-group - may differ from performance on non-cooperative tasks. Differences would depend on how each individual perceives their effort to affect not only their own monetary outcomes (and the monetary outcomes of others, if deemed of direct or
indirect importance), but also the social outcomes described above.

Given these factors, it is difficult to make a definitive prediction regarding how group identification and the decision to cooperate will affect task performance. As such, we propose the following research question:

**RESEARCH QUESTION.** *Does individuals’ group identification and/or their decision to cooperate affect their task performance?*

### 3. Method

**Design & Participants**

To study the effects of multi-level group identification on intergroup cooperation and performance, we conduct a 2 (sub-group identification: high or low) × 2 (superordinate group identification: high or low) × 4 (periods) mixed factorial design experiment. Sub-group identification and superordinate group identification were manipulated between-subjects, and the multiple periods of the experiment resulted in within-subjects repeated measures of the dependent variables. Two hundred and sixteen individuals from Amazon’s Mechanical Turk (MTurk) internet marketplace were recruited for the experiment through a publicly-announced Human Intelligence Task (HIT). MTurk workers were deemed eligible to participate in the experiment as long as they had a historical HIT approval rating of 98% or higher and were based in the United States. Participants were paid a $1.00 participation fee, as well as additional compensation as outlined below, to complete the experiment. Total compensation averaged $4.87 across all conditions.²

As part of the MTurk recruitment materials, participants were informed that they should

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² Research finds that the typical MTurk worker is willing to work for about $1.38 per hour (Paolocci et al. 2010). The average compensation in this study of $4.87 equates to approximately $6.50 per hour.
begin the experiment at the pre-determined date and time noted in the MTurk HIT assignment.³ Participants were further informed that their work in the experiment would involve completing a task while working as part of a group of three individuals (this serves as the participant’s sub-group), and that their group also belonged to a fictional company that was comprised of their group and two other groups of equal size (the company serves as the participant’s superordinate group). It was made clear to participants that they would not be interacting with their other group members, or members of other groups, during or after the experiment. Participants completed the experiment by visiting a link provided to them via the MTurk website, which directed them to a web application containing all experimental materials.⁴

**Task & Manipulations**

The experimental task involved the decoding of strings of capital letters, five characters in length, into numbers using a decoding key provided on-screen.⁵ A set of 500 strings was generated for use in the experiment using a random draw of the letters A-P for each of the five characters in each string (with replacement), and decoding values for each letter were generated using a random draw of the numbers 1-26 (without replacement). This resulted in half of the letters having one-digit decoding values and the other half having two-digit decoding values. Participants completed one three-minute practice period and four four-minute work periods, during which they worked on the decoding task to earn compensation as described in the

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³ Since the experiment required no interaction between group members, we avoided some of the potential pitfalls of group studies in an online environment (e.g., occasional drop-outs, or participants working at different paces) by forming groups post-hoc for purposes of determining compensation. To do so, we randomly assigned each of the 54 participants in each condition to a group (consisting of three individuals), and then randomly assigned each group to a company (consisting of three groups), consistent with the organizational structure noted in the experimental materials. The scheduled start time was intended to increase the salience of the group aspect of the study. Moreover, and as participants were informed, there was no deception present in any part of the experiment.

⁴ The web application was programmed for this experiment using the oTree platform (Chen et al. 2016).

⁵ The task is loosely adapted from prior studies, such as Chow (1983) and Waller & Chow (1985).
procedures below.⁶

To achieve equal groups while allowing participants to complete the experiment at their own pace, participants were assigned to one of the four experimental conditions – in succession – upon entering the online instrument. Both sub-group identification and superordinate group identification were manipulated through the use of narratives describing the participant’s assigned group and company. Specifically, participants were told to assume that for the duration of the experiment, they were an employee of either Dynamatic Company (high superordinate group identification) or Zenadrone Company (low superordinate group identification), and that they were a member of Group Proton (high sub-group identification) or Group Nulliset (low sub-group identification).⁷

The company and group narratives were constructed with the goal of inducing general awareness of one’s membership in each group, combined with either high or low affective (i.e. emotional involvement with the group) and evaluative (i.e. positive or negative value connotation associated with the group) identification with each group or company as appropriate for each particular condition.

For the company descriptions, this included mentions of the overall organizational culture, mission/values, tone at the top, and perceptions of the firm by outsiders. Care was taken to ensure an approximate balance between conditions in terms of the amount of information presented, such that for each company characteristic employed to manipulate identification, Dynamatic received a “positive” version of the characteristic and Zenadrone received a

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⁶ To control for any differences in the decoding difficulty of individual letter strings, all participants received the same sets of strings in any single round.
⁷ These company and group names – and the logos used to represent them at various points in the online instrument – were chosen to be consistent with the general identification valence of the particular group. For example, the name “Zenadrone Company” should sound generic and relatively cold in nature, and its logo of an abstracted toxic waste symbol should at the least not generate any positive feelings or attraction in participants.
“negative” (or “neutral”) version of the characteristic. The same general approach was used for the descriptions of Group Proton and Group Nulliset in order to manipulate sub-group identification. These descriptions included mentions of the manner in which the individual joined the group, group management style, whether or not teammates value and respect the individual’s opinions and contributions, flexibility of work schedule, work location desirability, perceived group-company goal alignment, and past upward mobility of group members within the company. Within the group and company narrative information, participants were also shown an abbreviated organizational chart that further illustrated the nesting of their group within their company, as well as the presence of the other two (nameless) groups in their company (see Appendix A for sample narratives).

**Procedures**

The experiment consisted of four parts: (1) instructions and a brief quiz to test participants’ understanding of the instructional materials, (2) a three-minute practice period to allow participants to become familiar with the experimental task, (3) four four-minute work periods during which participants worked on the experimental task in order to earn additional compensation beyond their participation fee, and (4) an anonymous post-experiment questionnaire (PEQ).

In the first part of the experiment, participants reviewed instructions that further explained the group and company setting (as described earlier) and were presented with narratives intended to manipulate sub-group and superordinate group identification. Participants were then provided with detailed information pertaining to the experimental task and the operation of the practice period and work periods.

As explained to participants, each period operated in the following manner. Participants
were presented with an initial allocation of eight letter strings to be decoded and were provided with an on-screen timer that counted down the time remaining in the period. After submitting their work, participants’ time was paused, and they were presented with two options. They could: (1) work on additional decoding that would earn compensation for themselves and the members of another group within their company of their choosing, or (2) work on additional decoding that would earn compensation for themselves only. If they chose the first option, participants were able to select which of the other two groups in their company they wished to benefit with their work (see Appendix A for screenshots of the experimental instrument) and were then presented with additional letter strings they could work on decoding until their time expired. If they chose the second option, participants were presented with additional letter strings they could work on decoding until their time expired.

As noted earlier, participants earned compensation based on the letter strings they – and others – correctly decoded in a randomly selected work period. For each string decoded from the initial allocation of eight strings, participants received $0.10, and each of their two sub-group members also received $0.10. If they chose to work for the benefit of themselves and another group in the second part of the compensated period, participants received $0.05 for each correctly-decoded string, and each member of the group chosen to benefit from this work also received $0.05. Finally, if they chose to work for the benefit of themselves alone in the second part of the compensated period, participants received $0.10 for each correctly-decoded string.

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8 In pre-testing, individuals were able to decode the first eight strings in an average of approximately one minute and thirty seconds. Therefore, the four-minute duration of the work periods should create a setting in which participants have slightly more than half of their time each period to earn compensation in the manner they choose.

9 The instructions explained that all work completed for the benefit of other groups would not be made known to the recipients until the conclusion of the experiment, and would remain anonymous even then. This was done to control any expectations of reciprocity that may factor into participants’ decision-making.
(making cooperation personally costly). As part of the instructional materials, these compensation rules were explained in detail, with examples, to participants.

Participants completed a practice period and four work periods as just described, and were then directed to the post-experiment questionnaire. The questionnaire contained several questions related to the participants’ identification with both their group and their company. These questions, adapted from prior literature (see Ashforth and Mael 1989; Riketta 2005; Riketta and Van Dick 2005), measured participants’ cognitive, evaluative, and affective identification with their group and company. Additional questions asked participants about their motivation(s) for their decisions to work for the benefit of other groups (e.g., concerns about total payoffs, perceived competition) or not, as well as their potential concerns for their own group members.

4. Results

Group Identification

The PEQ contained an equal number of items designed to measure participants’ identification with their assigned group (representing the sub-group factor) and company (representing the superordinate group factor). These items were all scaled from 1 (“Strongly disagree”) to 5 (“Strongly agree”) - and three (two) of the five in each group contained elements of identification where stronger agreement (disagreement) with the statement signaled higher identification. To examine the effectiveness of the experimental manipulations, we construct identification scores for both the sub-group and superordinate group by taking an average of the

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10 While cooperation is costly to the individual, overall welfare is higher. For each string correctly decoded in a period in which the individual chooses cooperation, the total payoff is $0.20 ($0.05 to the individual, and $0.05 × 3 = $0.15 to the group the individual chooses to benefit). This compares to a total payoff of $0.10 (all to the individual) in periods in which the individual chooses to benefit themselves with their additional work.
five questions targeted at each factor, reverse-scoring the questions where identification hinged on disagreement.11

As illustrated in Table 1, sub-group and superordinate group identification scores within each of the four experimental conditions (hereafter abbreviated sub-super, with “H” representing high identification conditions and “L” representing low identification conditions) are directionally consistent with the intended manipulations. The mean sub-group identification score for participants in the high sub-group identification conditions (3.13) is significantly greater (p < 0.01) than the mean score for participants in the low sub-group identification conditions (2.70). Furthermore, sub-group identification scores for participants in the H-H (3.15) and H-L (3.11) conditions are not significantly different (p > 0.99) from each other, and are significantly greater (all p’s < 0.01) than scores for participants in the L-H (2.71) and L-L (2.69) conditions. In summary, there is evidence of successful manipulation of sub-group identification.

(Table 1)

The mean superordinate group identification score for participants in the high superordinate group identification conditions (3.06) is significantly greater (p < 0.01) than the mean score for participants in the low superordinate group identification conditions (2.55). In addition, the mean scores for participants in the H-H (3.24) and L-H (2.89) conditions are significantly greater (p < 0.01) than the mean score for participants in the L-L (2.29) condition, and at least directionally greater than the mean score for participants in the H-L (2.80) condition.12 Taken together, these results provide evidence that the superordinate group

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11 For this and subsequent analyses, we exclude 12 participants who failed one or more of three manipulation/attention checks present in the PEQ. These checks required participants to: (1) select their group and (2) company names from separate lists of three names, where the two incorrect responses would not have been seen anywhere in the experiment, and (3) provide the correct response to the following item: “Please select ‘5’ to show that you are paying attention.” Including these 12 participants leaves general inferences unchanged.

12 The difference in scores between the H-H (3.24) and H-L (2.80) conditions is significant (p < 0.01), while the difference in scores between the L-H (2.89) and H-L (2.80) conditions is not (p = 0.50). The general pattern of
identification manipulations were successful.

**Descriptive Statistics**

Table 2, Panel A presents descriptive statistics illustrating the portion of compensated rounds in which participants chose to cooperate with other groups, while Figure 4 provides a graphical representation of these decisions across conditions. As can be seen in Table 2, Panel A, the differences in cooperation observed between high and low sub-group identification conditions (cooperation in 33% and 15% of compensated rounds, respectively) suggests the presence of a main effect of sub-group identification on one’s decision to cooperate. In addition, the differences in cooperation observed between high and low superordinate group identification conditions (cooperation in 27% and 21% of compensated rounds, respectively), combined with the general pattern of results found across all four experimental conditions, suggest a possible main effect of superordinate group identification, as well as a potential interactive effect between sub-group and superordinate group identification, on an individual’s likelihood of choosing to cooperate. We formally examine these patterns of results in our subsequent hypothesis tests.

Table 2, Panel B presents descriptive statistics pertaining to participants’ task performance in rounds in which they chose to cooperate with another group after completing their initial work versus rounds in which they chose only to benefit themselves with additional work. Within rounds, Panel B also tracks participants’ task performance on work completed as part of their initial allocation of letter strings versus their task performance on work completed after facing the decision to cooperate or work for themselves.

As illustrated in Panel B, performance in both phases (4.78 strings per minute in initial superordinate identification scores observed is consistent with some identification projection (or “spillover”) from the sub-group level to the superordinate group level as noted by prior research (Ashforth et al. 2008). This is best seen in the large differences in superordinate group identification for the H-H (3.24) vs. L-H (2.89), and H-L (2.80) vs. L-L (2.29) conditions.
work and 4.65 strings per minute in post-decision work) of cooperative rounds was significantly lower than performance in corresponding phases (5.79 strings per minute in initial work and 5.73 strings per minute in post-decision work) of non-cooperative rounds for all participants combined, suggesting potential effort differences driven by the decision to cooperate. We further discuss these findings in tests of our research question.

(Table 2 and Figure 4)

Tests of Hypotheses & Research Question

We examine the effects of sub-group identification and superordinate group identification on individuals’ decisions to cooperate using two approaches. First, we estimate logistic regression models with the decision to cooperate (Cooperation) as a binary dependent variable and indicator variables for high/low (as manipulated in our experimental conditions) sub-group identification, superordinate group identification, and their interaction as predictors, along with control variables suggested by theory.

Second, to provide a more complete picture of the effects of sub-group identification and superordinate group identification on individuals’ decisions to cooperate and their subsequent task performance, as well as potential mediating effects, we construct a generalized structural equation model (GSEM). A GSEM allows us to explore components of the (proposed) process through which sub-group and superordinate group identification impact individuals’ decisions to cooperate and their subsequent task performance. The model includes the binary decision to cooperate (Cooperation) as a dependent variable of sub-group identification, superordinate group identification, and their interaction (constructed using factor scores from the identification

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13 Given that the Cooperation variable is binary, all links (paths) to this variable were specified as probit regression links, whereas links between other continuous variables (sub-group identification, superordinate group identification, the interaction term, concern for the larger collective, perception of intergroup competition, and task performance) were specified as the equivalent of linear regression links.
questions in the PEQ, as referenced previously), as well as potential mediating factors suggested by theory. Given our research question, the GSEM also models Cooperation as a potential predictor of Task Performance (measured as efficiency on work completed after making the decision to cooperate), and simultaneously estimates the direct and indirect links between these variables.

Since the model requires an interaction between two latent variables, sub-group identification and superordinate group identification, we follow the method suggested by Jöreskog (1998) and first estimate the measurement model for all latent variables. This includes the two mediating variables: (1) Concern for the Larger Collective (hereafter Collective), which is measured using three items from the PEQ that capture participants’ motivation(s) for choosing cooperation related to superordinate group outcomes and influences, and (2) Perception of Intergroup Competition (hereafter Competition), which is measured using two items from the PEQ that capture the extent to which participants believed their sub-group was in competition with others. Resulting factor scores are then used to estimate the structural model, with standard errors clustered by participant.14 Standardized path coefficients are presented in Figure 5.15 Overall, the model is an excellent fit for the data, with an insignificant (p = 0.34) chi-square test, and all other measures of fit (error) above (below) generally accepted levels (CFI = 0.99; TLI = 0.98; RMSEA = 0.01; WRMSR = 0.48).

(Figure 5)

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14 We follow Muthen’s (2011) suggestion of using a WLSMV estimator for a model with a binary dependent variable and continuous mediating variables and independent variables. Doing so in the MPlus program carries the added benefit of allowing us to obtain standardized coefficients and overall fit indices that otherwise would not be available in a GSEM model.

15 Gender and task difficulty are included as control variables in the modeling of the decision to cooperate and subsequent task performance, but omitted from Figure 5 for the sake of parsimony. The paths between these control variables and the cooperation decision are not significant (all p’s > 0.60), though including them does slightly improve the overall fit of the model.
Test of Hypothesis 1 (H1) – Sub-Group Identification

H1 predicts that high sub-group identifiers will exhibit more frequent intergroup cooperation than low sub-group identifiers. To test H1, we estimate a logistic regression model with Cooperation as the dependent variable, HighSubID as the independent variable, and Gender, TaskDiff and InitialWork as the control variables. Cooperation equals one (zero) if a participant chose to cooperate (not cooperate) with another sub-group during the period. HighSubID is an indicator variable that equals one (zero) if a participant was randomly assigned to the high (low) sub-group identification conditions. Gender is used as a control variable, based on prior research that provides evidence of less intergroup, and more intragroup, cooperation from males than females (Balliet et al. 2014). We also include task difficulty (TaskDiff - which is based on a PEQ item) as a control variable, and expect that higher perceived difficulty will lead to increased cooperation in our setting due primarily to an effect of dependency-creating assistance suggested in prior research (Hornsey and Hogg 2000b; Yzerbyt and Demoulin 2010). The third control variable included (InitialWork) is a measure of the number of letter strings the participant correctly decoded from their initial allocation of eight strings in the work period. As noted in the previous discussion of our research question, there may be differences in effort provided by participants in cooperative versus non-cooperative rounds, and controlling for a measure of the initial work successfully completed allows us to separate the effects of group identification from other factors that may be influencing behavior.

The results of our test of H1 are presented in Model (1) of Table 3. Consistent with

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16 Consistent with Balliet et al.’s (2014) general finding of less intergroup cooperation from males than females, male participants in our experiment cooperated less often than female participants across all conditions combined (p < 0.01). In examining results by condition, male participants cooperated less often than female participants in both the H-H and L-H conditions (both p’s < 0.05), though differences in cooperation between males and females in the other two conditions (H-L and L-L) are not significant (both p’s > 0.40).
expectations, this model reveals that the coefficient on our variable of interest, $\text{HighSubID}$ is positive and significant ($p < 0.01$), providing support for H1. Moreover, our results suggest that the odds of cooperating with another sub-group are 2.74 times higher in the high sub-group identification conditions than in the low sub-group identification conditions.

(Table 3)

To further examine the effect of sub-group identification on one’s decision to cooperate, we refer to our GSEM in Figure 5. As predicted, sub-group identification has a positive direct effect on the decision to cooperate (Link 1, 0.32, $p < 0.01$). To help determine indirect effects, we examine the paths between the mediating variables and the decision to cooperate. As predicted, the mediating variable $\text{Collective}$ has a positive (Link 10, 0.62, $p < 0.01$) effect on the decision to cooperate, while the mediating variable $\text{Competition}$ has a negative (Link 11, -0.11, $p < 0.01$) effect on the decision to cooperate. Again consistent with our predictions, sub-group identification has a positive (Link 4, 0.57, $p < 0.01$) effect on $\text{Collective}$ and a positive (Link 5, 0.15, $p = 0.09$) effect on $\text{Competition}$. The total indirect effect (Link 4×Link 10 + Link 5×Link 11) of sub-group identification on the decision to cooperate is therefore positive (0.34, $p < 0.01$), as is the total effect (Link 1 + total indirect effect = 0.65, $p < 0.01$). These results provide additional support for H1, and suggest that the effect of sub-group identification on the decision to cooperate is partially mediated by $\text{Collective}$ and $\text{Competition}$.

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17 When we estimate our logistic regression models using continuous factor scores for our group identification constructs as we do in our GSEM, instead of indicator variables for the manipulated conditions, our inferences are unchanged and the statistical significance of the coefficients on our variables of interest increases. Given that identification with any group can vary in degree along some continuum, and our manipulations are designed to move individuals along this continuum, use of these continuous predictors provides results that are perhaps more informative than binary “high” vs. “low” designations.

18 In all of our regression models, results for the three control variables described earlier are directionally consistent with expectations, though the result for task difficulty is not statistically significant (all $p$’s > 0.27).
Test of Hypothesis 2 (H2) – Superordinate Group Identification

H2 predicts that high superordinate group identifiers will exhibit more frequent intergroup cooperation than low superordinate group identifiers. To test H2, we estimate a logistic regression model with Cooperation as the dependent variable, HighSuperID as the independent variable, and Gender, TaskDiff and InitialWork as the control variables. Cooperation equals one (zero) if a participant chose to cooperate (not cooperate) with another sub-group during the period. HighSuperID is an indicator variable that equals one (zero) if a participant was randomly assigned to the high (low) superordinate group identification conditions. Gender, TaskDiff, and InitialWork are control variables and are defined as described for our tests of H1.

The results of our test of H2 are presented in Model (2) of Table 3. As shown in Model (2), we find a marginally significant positive effect of superordinate group identification (p = 0.10), providing some support for H2. Moreover, our results suggest that the odds of cooperating with another sub-group are 1.44 times higher in the high superordinate group identification conditions than in the low superordinate group identification conditions.

To provide further evidence with regard to the effect of superordinate group identification on one’s decision to cooperate, we return to our GSEM in Figure 5. Inconsistent with predictions, we observe no direct effect (Link 2, 0.02, p = 0.38) of high superordinate group identification on the decision to cooperate. However, we do find that superordinate group identification exhibits a positive (Link 6, 0.17, p < 0.05) effect on Collective, as well as a negative (Link 7, -0.27, p < 0.01) effect on Competition, both of which are in line with predictions. This results in a positive (0.13, p < 0.05) total indirect (Link 6×Link 10 + Link 7×Link 11) effect, as well as a positive total effect (Link 2 + total indirect effect = 0.15, p <
0.05), of superordinate group identification on the decision to cooperate, which provides additional support for H2 and suggests that the effect of superordinate group identification on the decision to cooperate is fully mediated by Collective and Competition. We also find that the total effect of sub-group identification on the decision to cooperate (0.65) is more than four times as large as the total effect of superordinate group identification (0.15). The relative importance of these factors in the model is consistent with the results observed in the logistic regression model tests described earlier, and emphasizes the critical nature of sub-group identification with regard to influencing cooperative behavior at the intergroup level.

**Test of Hypothesis 3 (H3) – Interaction**

While H1 and H2 predict main effects of sub-group and superordinate group identification on individuals’ decisions to cooperate with other groups, H3 predicts an interaction between the two factors such that differences in intergroup cooperation between low and high sub-group identifiers will be magnified in the presence of high superordinate group identification. To test H3, we estimate a logistic regression model with Cooperation as the dependent variable, HighSubID, HighSuperID, and HighSubID×HighSuperID as independent variables. We also include Gender, TaskDiff and InitialWork as control variables. All variables are defined as described for our previous tests of H1 and H2.

The results of our test of H3 are presented in Model (3) of Table 3. As predicted by H3, we expect the coefficient on HighSubID×HighSuperID to be positive and statistically significant. As shown in Model (3), the coefficient for the interaction variable HighSubID×HighSuperID is positive, but not significant (p = 0.37), which does not support H3. While the coefficient on the interaction term in Model (3) is not significant, a contrast test using coefficients of -2, -1, 1, and 2 for L-L, L-H, H-L, and H-H conditions (consistent with the pattern predicted in our
hypotheses) indicates a significant interaction between sub-group identification and superordinate group identification (odds ratio = 3.37, p < 0.01).

We again return to our GSEM in Figure 5 to further examine the direct and indirect effects of an interaction between sub-group identification and superordinate group identification on one’s decision to cooperate. Consistent with predictions and providing support for H3, we find a positive (Link 3, 0.11, p = 0.08) direct effect of the interaction between sub-group and superordinate group identification on the decision to cooperate. While the total indirect (Link 8×Link 10 + Link 9×Link 11) effect of the interaction term on the decision to cooperate is near zero and not significant (-0.01, p = 0.45), the total effect is positive and marginally significant (Link 3 + total indirect effect = 0.10, p = 0.09), providing support for H3.

In summary, most of the links (8 of 11) in our GSEM relating to the decision to cooperate are significant, or marginally significant, and consistent with predictions. These results provide support for both H1 and H2, as well as some support for H3, and provide a more complete picture of the direct and indirect effects of sub-group identification and superordinate group identification on an individual’s decision to cooperate.

**Research Question – Cooperative Performance**

Our research question addresses potential differences in task performance as a function of group identification and the decision to cooperate. Across all rounds, (untabulated) average performance – measured as the number of strings correctly decoded per minute – by participants in low sub-group identification conditions is significantly greater (all p’s < 0.05) than performance by participants in high sub-group identification conditions in initial work (5.69 vs. 5.40), post-decision work (5.63 vs. 5.31), and the two phases of the work period combined (11.32 vs. 10.71). Similarly, participants in low superordinate group identification conditions
exhibit significantly greater (untabulated, all p’s < 0.05) performance than participants in high superordinate group identification conditions in initial work (5.69 vs. 5.41), post-decision work (5.59 vs. 5.35), and the two phases combined (11.27 vs. 10.76).

Given the previously noted results of differences in: (1) performance between cooperative and non-cooperative rounds for the average participant across all conditions (see Table 2, panel B), and (2) the frequency of cooperation across conditions, isolating any effect of sub-group or superordinate group identification on performance requires analysis that is conditional on one’s decision to cooperate. Returning to the results in Table 2, panel B, (untabulated) multiple comparison tests find no significant (all p’s > 0.11) performance differences between high and low sub-group identification conditions in either phase of the work period in either cooperative or non-cooperative rounds. In addition, (untabulated) multiple comparison tests find no significant (both p’s > 0.72) performance differences between high and low superordinate group identification conditions in either phase of non-cooperative rounds, but do find that the performance of low superordinate group identifiers is significantly greater (both p’s < 0.01) than that of high superordinate group identifiers in both phases of cooperative rounds.19

Taken together, these results suggest that the effect of one’s decision to cooperate on performance dominates any effect of sub-group or superordinate group identification. Moreover,

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19 Unlike participants in the other three conditions, participants in the H-L condition do not exhibit any performance differences between cooperative and non-cooperative rounds. Given the relatively frequent cooperation of these participants, this result suggests that the performance differences between low and high superordinate group identifiers in cooperative rounds is not a function of that group identification, but is instead attributable to the performance differences (and lack thereof, in the case of H-L participants) driven by one’s decision to cooperate. PEQ evidence may be helpful in explaining the behavior of H-L participants. These participants viewed other groups less positively than their own and perceived the least amount of competition at the sub-group level out of all four conditions. This lack of threat to sub-group identity and perception of other groups as “weaker” may have caused these participants to adopt a dependency-creating approach to intergroup cooperation, an effect suggested in prior research in psychology (e.g., Hornsey & Hogg 2000b; Yzerbyt and Demoulin 2010).
given that differences in average performance between cooperative and non-cooperative rounds are observed in both phases of the round, it also seems likely that participants make the decision to cooperate prior to starting the round, and the reduction in effort observed for most participants on post-decision work thus “spills forward” – perhaps sub-consciously – to affect work completed prior to indicating their decision to cooperate.

To further examine how group identification and the decision to cooperate affect task performance, we return to our GSEM in Figure 5. The model shows no significant (all p’s > 0.36, two-tailed) direct effects of sub-group identification (Link 13), superordinate group identification (Link 14), or the interaction between the two (Link 15) on participants’ task performance. However, there are negative indirect effects of sub-group identification (-0.23, p < 0.01), superordinate group identification (-0.05, p = 0.06), and the interaction term (-0.04, p = 0.10) on task performance. These results are attributable to the highly significant negative effect of the decision to cooperate on task performance (Link 12, -0.34, p < 0.01), and suggest that sub-group and superordinate group identification thus affect task performance through the decision to cooperate. All results are robust to using participants’ efficiency on initial work allocations as the measure of task performance, which lends additional support to the notion above that participants appear to be making decisions to cooperate prior to beginning each round (since they know they will face the decision during the round), and that this decision affects their task performance in both phases of the round. In summary, the observed results for cooperative performance in our study generate a clear implication: achieving optimal firm outcomes when intergroup interactions exist may require more careful consideration than simply targeting maximum cooperation.
5. Conclusion

We conduct an experiment to study the effects of multi-level group identification on intergroup cooperation and performance. Consistent with expectations, we find that participants in both high sub-group and high superordinate group identification conditions cooperate more often than participants in low identification conditions, and that these effects are mediated by perceptions of intergroup competition and a concern for the larger collective. In addition, we find some evidence that the difference in cooperation between high and low sub-group identification conditions is magnified with high superordinate group identification. Finally, we examine task performance and find that performance is lower when individuals choose to cooperate, and that the negative performance effects of sub-group and/or superordinate group identification operate through the decision to cooperate.

Our findings have implications for organizational design. Given that prior research shows that greater decentralization is likely to lead to higher levels of sub-group identification (Ashforth et al. 2008), our finding of more frequent cooperation by high sub-group identifiers highlights another potential benefit to decentralization, in addition to the others noted by prior research (e.g., Indjejikian and Matějka 2012). Relatedly, our finding of a potential interactive effect between sub-group and superordinate group identification on individuals’ likelihood of choosing intergroup cooperation highlights a potential benefit of greater congruence between lower-level (sub-group) goals and higher-level (superordinate group) goals. Greater alignment is likely to lead to greater identification with both groups and as such, organizations may be able to achieve sufficient intergroup outcomes without explicit incentives for intergroup behavior. By examining how one’s multiple group identities influence this intergroup behavior, we also extend prior accounting research (e.g., Towry 2003; Rowe 2004; Coletti et al. 2005; Brüggen and Moers...
that has focused on the effects of group identification or social norms on intragroup behavior within a single group.

Our findings also have implications for the design of performance evaluation, control, and compensation systems. For example, firms may be able to affect individuals’ identification with different organizational groups through communication and control mechanisms, and our finding of increased cooperation from high superordinate group identifiers suggests that firms may benefit from adopting “one team” communication strategies. However, attempts to increase the salience of a larger collective must not threaten valued sub-group identities, or such strategies could fail if individuals feel a need to fight to maintain sub-group differentiation.

Furthermore, the strength of our findings related to sub-group identification illustrate how critical sub-group identity is as it pertains to intergroup behavior, an important consideration for managers attempting to motivate team members toward achieving optimal firm outcomes in multi-level organizations. Our finding of lower performance on cooperative versus non-cooperative tasks suggests that firms may face a trade-off in motivating increases in intergroup cooperation versus motivating maximum individual and intragroup performance. As such, a more comprehensive understanding of the effects of group identification and cooperative decisions would help firms: (1) construct communication and control strategies to foster the most appropriate group identification given the firm’s group structure and characteristics of its employees, and (2) select appropriate evaluation and compensation systems that measure and reward performance along intergroup dimensions as necessary.

Our study also suggests some avenues for future research. Participants in our study worked under a single incentive structure in which their work efforts directly benefited themselves and others (their own sub-group in pre-decision work, and another sub-group if
choosing to cooperate on additional work), and future research could explore how different individual and/or group incentive structures change the behavior we observe. Finally, participants in our study were not provided with individual or group performance feedback during work periods. Future research could examine how the receipt of absolute or relative performance feedback interacts with the effects we observe of group identification and one’s decision to cooperate to change individuals’ immediate behavior, as well as their perceptions of our critical mediating variables – intergroup competition and a concern for the larger collective – over repeated periods.
REFERENCES


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<td>2.91 (0.70)</td>
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Notes:
\(^1\) Mean (sd). An average of five PEQ questions related to the participant’s identification with their assigned group.
\(^2\) Mean (sd). An average of five PEQ questions related to the participant’s identification with their assigned company.
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Panel B: Task Performance – Cooperative vs. Non-Cooperative Rounds

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<td>All</td>
<td></td>
<td>816</td>
<td>4.78 (2.05)</td>
<td>4.65 (2.17)</td>
</tr>
</tbody>
</table>

Notes:
¹ Cooperative rounds are those in which the participant chose to work for the benefit of themselves and another group after submitting their work on the initial allocation of letter strings, while non-cooperative rounds are those in which the participant chose to work for the benefit of themselves only after submitting their initial work.
² Means in **bold (italics)** in the non-cooperative columns indicate a significant difference from corresponding means in the cooperative columns at p < 0.05 (p < 0.10).
³ Mean (sd). For participants’ initial allocation of eight letter strings each period, efficiency = number of strings correctly decoded / time spent (in minutes).
⁴ Mean (sd). For participants’ additional decoding work each period, efficiency = number of strings correctly decoded / time spent (in minutes).
**TABLE 3**

\[ \text{Logistic (Cooperation)} = \alpha + \beta_1 \text{HighSubID} + \beta_2 \text{HighSuperID} + \beta_3 \text{HighSubID} \times \text{HighSuperID} + \text{Gender} + \text{TaskDiff} + \text{InitialWork} + \epsilon \]

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.27* (0.20)</td>
<td>0.60 (0.41)</td>
<td>0.23** (0.18)</td>
</tr>
<tr>
<td>HighSubID</td>
<td>2.74*** (0.81)</td>
<td></td>
<td>2.48** (1.08)</td>
</tr>
<tr>
<td>HighSuperID</td>
<td></td>
<td>1.44* (0.40)</td>
<td>1.29 (0.55)</td>
</tr>
<tr>
<td>HighSubID \times HighSuperID</td>
<td></td>
<td></td>
<td>1.21 (0.70)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>1.74** (0.51)</td>
<td>1.75** (0.51)</td>
</tr>
<tr>
<td>TaskDiff</td>
<td>1.08 (0.14)</td>
<td>1.11 (0.14)</td>
<td>1.09 (0.14)</td>
</tr>
<tr>
<td>InitialWork</td>
<td>0.83** (0.08)</td>
<td>0.79*** (0.07)</td>
<td>0.82** (0.07)</td>
</tr>
<tr>
<td>n</td>
<td>816 (204 participants)</td>
<td>816 (204 participants)</td>
<td>816 (204 participants)</td>
</tr>
<tr>
<td>Wald Chi-square (prob &gt; chi2)</td>
<td>18.61 (0.00)</td>
<td>11.32 (0.02)</td>
<td>22.21 (0.00)</td>
</tr>
</tbody>
</table>

Notes:
1. Models 1, 2, and 3 use binary predictors for sub-group identification and superordinate group identification, where 1 = high identification and 0 = low identification for each factor, based on experimental condition.
2. Odds ratio (standard error) displayed for model results.
3. *, **, *** indicate significance at p < 0.10, p < 0.05, and p < 0.01, respectively. Standard errors are clustered by participant.
Figure 1

Intragroup cooperation within a single group

Intergroup cooperation between sub-groups within a superordinate group

Superordinate Group

Sub-group #1

Sub-group #2

Sub-group #3
Notes:
Figure 2 plots the predicted frequency of intergroup cooperation as a function of sub-group identification and superordinate group identification.
Figure 3 – Theoretical model for the predicted effects of multi-level group identification on intergroup cooperation and performance
Notes:
Figure 4 plots the portion of compensated rounds in which participants chose personally costly cooperation (working for the benefit of themselves and another group within their company), as a function of experimental condition.
Figure 5 - GSEM of the Effects of Multi-Level Group Identification on Intergroup Cooperation & Performance

- **Sub-Group Identification** – Factor score estimated using the five PEQ questions related to participants’ identification with their assigned group.

- **Superordinate Group Identification** – Factor score estimated using the five PEQ questions related to participants’ identification with their assigned company.

- **Sub*Super** – Interaction between Sub- and Superordinate Group Identification, constructed using the cross-product of the factor scores (Jöreskog 1998).

- **Collective** (Concern for the Larger Collective) – Factor score estimated using three PEQ questions pertaining to participants’ motivation to cooperate and benefit other sub-groups.

- **Competition** (Perception of Intergroup Competition) – Factor score estimated using two PEQ questions pertaining to participants’ perception of the competitiveness of the setting (i.e. competition with other sub-groups).

- **Cooperation** – Binary indicator = 1 if participant chose to work for the benefit of themselves and another sub-group, 0 otherwise.

- **Task Performance** – Participants’ efficiency (number of correctly decoded strings per minute) in work completed after making the decision to cooperate.

<table>
<thead>
<tr>
<th>Path</th>
<th>Coefficient</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Group Identification</td>
<td>.32***</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Superordinate Group</td>
<td>.57***</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Sub*Super</td>
<td>.11*</td>
<td>p &lt; 0.10</td>
</tr>
<tr>
<td>Collective</td>
<td>.17**</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>Competition</td>
<td>-.27***</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Cooperation</td>
<td>.62***</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Task Performance</td>
<td>.34***</td>
<td>p &lt; 0.01</td>
</tr>
</tbody>
</table>

**Fit:**
- CFI = 0.99
- TLI = 0.98
- RMSEA = 0.01
- χ² = 9.04, p = 0.34

**Residuals:**
- WRMSR = 0.48

All reported coefficients are standardized. *, **, *** represent significance at p < 0.10, p < 0.05, and p < 0.01, respectively (one-tailed tests for directional predictions). Standard errors are clustered by participant.
Appendix A

I. Sample narratives:

Low sub-group identification

You have been a member of Group Proton for the past two years, having joined the group at the same time as one of your good friends from the associate trainee program. Group Proton performs a variety of tasks for the company, and you believe that your role in Group Proton allows you the opportunity to do what you do best each day. From the time you joined Group Proton, you have felt that your contributions and opinions are valued and respected by other group members and the group’s manager. You are given assistance when needed, but you are otherwise free to work independently without being micro-managed. Working in Group Proton allows you to maintain a flexible work schedule, and you can work remotely at times if you choose to.

Each member of Group Proton seems to have a clear understanding of how their work fits together with the goals of the group, and with Zenadrone’s goals in general. Zenadrone’s CEO has recognized your group for its outstanding work on a number of occasions, and you believe the company truly appreciates the contributions of your group. Two of Group Proton’s former managers have attained executive-level positions within the company, so you feel Group Proton’s visibility opens up advancement opportunities for you as your career progresses.

Please proceed to the next page to complete a brief knowledge check regarding the instructions and information you just read.

High sub-group identification

You have been a member of Group Proton for the past two years, having joined the group at the same time as one of your good friends from the associate trainee program. Group Proton performs a variety of tasks for the company, and you believe that your role in Group Proton allows you the opportunity to do what you do best each day. From the time you joined Group Proton, you have felt that your contributions and opinions are valued and respected by other group members and the group’s manager. You are given assistance when needed, but you are otherwise free to work independently without being micro-managed. Working in Group Proton allows you to maintain a flexible work schedule, and you can work remotely at times if you choose to.

Each member of Group Proton seems to have a clear understanding of how their work fits together with the goals of the group, and with Dynamatic’s goals in general. Dynamatic’s CEO has recognized your group for its outstanding work on a number of occasions, and you believe the company truly appreciates the contributions of your group. Two of Group Proton’s former managers have attained executive-level positions within the company, so you feel Group Proton’s visibility opens up advancement opportunities for you as your career progresses.

Please proceed to the next page to complete a brief knowledge check regarding the instructions and information you just read.
Low superordinate group identification

For the duration of the experiment, assume you are an employee of Zenadrone Company. Zenadrone is a medium-sized firm with offices in a number of locations that provides consulting services to its customers across several functions – including technology, accounting/finance, operations, and environmental services. Zenadrone is widely known for its corporate culture that emphasizes a focus on bottom-line profits and little else. Zenadrone executive leadership generally expects employees to work as much as necessary to achieve the company's lofty objectives, even if that means spending seven days per week in the office. Dozens of former and current employees have reported that this hard work is not often rewarded appropriately, and that to get ahead at Zenadrone one must be on the right side of ongoing office politics.

Leadership views employees as easily replaceable, and in fact the company relies on a relatively high amount of employee turnover to maintain low salary costs by replacing exiting employees with lower-cost new hires. Zenadrone has faced some public scrutiny for these questionable human resource policies, though these concerns have recently been overshadowed by a class-action lawsuit filed against the company for alleged wrongdoings in the environmental services consulting business, where Zenadrone is reported to have advised clients on how to avoid civil penalties incurred for dumping toxic waste in eight different countries.

Zenadrone hired you a few years ago as part of its associate trainee program. During your new hire orientation, Zenadrone’s CEO, Abbie Smith, spoke briefly to all the new hires to highlight the importance of the “profitability first, last, and always” mentality that Zenadrone believes is necessary for success in the consulting industry. Zenadrone has been moderately profitable since you joined the company, though executive leadership has claimed that the company continues to fall short of cost-cutting goals and needs to continue to save costs wherever possible. The partial organizational structure of Zenadrone is shown below:

High superordinate group identification

For the duration of the experiment, assume you are an employee of Dynamatic Company. Dynamatic is a medium-sized firm with offices in a number of locations that provides consulting services to its customers across a number of functions – including technology, accounting/finance, operations, and environmental services.

Dynamatic takes pride in employing a diverse workforce, and maintaining an environment where individuals’ work-life balance is both valued and encouraged. That emphasis has paid off, as Dynamatic was recently designated one of Fortune magazine’s “50 Best Places to Work” an honor they have received for five consecutive years. Fortune magazine’s company review also named Dynamatic one of the “100 Most Socially Responsible Companies,” primarily due to Dynamatic’s work in environmental services consulting and its continued involvement in local communities.

Dynamatic hired you several years ago as part of its associate trainee program, and has since promoted you to the rank of senior associate. Dynamatic’s CEO, Abbie Smith, interviewed you personally and visited you at your home prior to you joining the company, promising you and your family that Dynamatic would be a continued success in both financial terms and in being an example to others of how a business can be socially responsible and profitable. This vision has proven successful, as Dynamatic’s revenue and profitability have increased steadily since you joined the company. The organizational structure of Dynamatic is shown below:
II. Abbreviated organizational chart shown with group narratives

Low/High condition:

High/Low condition:
III. Decision point at which participants chose whether to cooperate or not

You have completed the decoding of your initial allocation of letter strings. You may use the time you have remaining in the period (which has been temporarily paused) in either of the following ways:

1. Work on additional letter-number decoding that earns compensation for you and for the members of another group of your choosing. This work will be completed anonymously. That is, the other group will not know that they have received this benefit until the entire experiment ends, and will never know that you are the one who provided this benefit. Similarly, any benefit your group receives from a member of another group during the experiment will remain anonymous as well.

   If you select this option, you will be re-directed to a screen on which you will choose the group you wish to benefit with this work. After which you will be taken to a separate screen to complete the decoding task. Recall that if choosing this option, you will receive $0.05 for each string you correctly decode, and each member of the group you choose to benefit will receive $0.05 (x 3 group members).

2. Work on additional letter-number decoding that earns compensation for you only. Recall that if choosing this option, you will receive $0.10 for each string you correctly decode.

   If you select this option, you will be re-directed to a separate screen to complete the decoding task.

Please make your choice and click "Next" to proceed.

- Option #1 - work on decoding that earns compensation for you and the members of another group
- Option #2 - work on decoding that earns compensation for you only

If choosing to cooperate, participants then selected the target group for their cooperative work

Recall that there are three groups in your company. Please choose the group you wish to benefit with the work you complete in the time remaining in the period, and then click "Next" to continue.

- Other Group #1
- Other Group #2

Next