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Published in:
Academy of Management Journal

Document version:
Version created as part of publication process; publisher's layout; not normally made publicly available

DOI:
10.5465/amj.2018.0325

Publication date:
2020

ACADEMY OF Management Journal

Identity Asymmetries: An Experimental Investigation of Social Identity and Information Exchange in Multiteam Systems

Journal:	*Academy of Management Journal*
Manuscript ID	AMJ-2018-0325.R5
Manuscript Type:	Revision
Keywords:	Lab experiment < Quantitative Orientation < Research Methods, Simulation < Quantitative Orientation < Research Methods, Social identity theory < Theoretical Perspectives, Communication < Group/team processes < Organizational Behavior < Topic Areas, Coordination < Group/team processes < Organizational Behavior < Topic Areas, Intergroup relations < Group/team processes < Organizational Behavior < Topic Areas
Abstract:	Many complex organizational tasks are performed by networks of teams – multiteam systems. A critical challenge in multiteam systems is how to promote information exchange across teams. In three studies, we investigate how identity asymmetries, i.e., differences between teams in terms of whether the team or overarching system constitutes their primary focus of identification, affect inter-team information sharing and performance. In Study 1, we manipulate teams' foci of identification (team- or system-focused) in a sample of 84 five-member teams working in one of 21 four-team multiteam systems performing a computer strategy simulation. We find that, while system-focused teams shared information equally with all teams, team-focused teams shared less information with system-focused teams than they did with other team-focused teams. Inter-team information sharing positively predicted inter-team performance. In Study 2, we test the assumptions underlying our theory in a vignette experiment, demonstrating that team-focused individuals adopt instrumental motives toward inter-team interaction. Finally, in Study 3, we investigate the implications of system composition in terms of team identity foci by means of a simulation study based on the empirical results of Study 1. The results of the simulation yield novel propositions about the non-linear effects of social identity in multiteam systems.

Identity Asymmetries: An Experimental Investigation of Social Identity and Information Exchange in Multiteam Systems

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Acknowledgements: The authors would like to thank Professor Prithviraj Chattopadhyay and three anonymous reviewers for their thoughtful and developmental suggestions throughout the review process. We also thank Daan van Knippenberg, Sujin Jang, as well as seminar participants at ESSEC Business School, INSEAD, and the Rotterdam School of Management for insightful feedback.

IDENTITY ASYMMETRIES: AN EXPERIMENTAL INVESTIGATION OF SOCIAL IDENTITY AND INFORMATION EXCHANGE IN MULTITEAM SYSTEMS

ABSTRACT

Many complex organizational tasks are performed by networks of teams – multiteam systems. A critical challenge in multiteam systems is how to promote information exchange across teams. In three studies, we investigate how identity asymmetries, i.e., differences between teams in terms of whether the team or overarching system constitutes their primary focus of identification, affect inter-team information sharing and performance. In Study 1, we manipulate teams' foci of identification (team- or system-focused) in a sample of 84 five-member teams working in one of 21 four-team multiteam systems performing a computer strategy simulation. We find that, while system-focused teams shared information equally with all teams, team-focused teams shared less information with system-focused teams than they did with other team-focused teams. Inter-team information sharing positively predicted inter-team performance. In Study 2, we test the assumptions underlying our theory in a vignette experiment, demonstrating that team-focused individuals adopt instrumental motives toward inter-team interaction. Finally, in Study 3, we investigate the implications of system composition in terms of team identity foci by means of a simulation study based on the empirical results of Study 1. The results of the simulation yield novel propositions about the non-linear effects of social identity in multiteam systems.

Keywords: Teams, multiteam systems, social identity, intergroup relations, information sharing

Many complex organizational activities go beyond the capabilities of single teams and require the interdependent and coordinated action of multiple teams in the pursuit of collective goals (de Vries, Hollenbeck, Davison, Walter, & Vegt, 2016; Mathieu, Hollenbeck, van Knippenberg, & Ilgen, 2017). For example, large-scale research or new product development projects often consist of multiple specialized teams that develop differentiated modules that need to be integrated into a coherent product (Aalbers, Dolfsma, & Leenders, 2016; Hoegl & Weinkauf, 2004; Leenders & Dolfsma, 2016). Emergency medical care requires interdependent collaboration of multiple teams – e.g., a paramedics team, an emergency unit team, and a stationary care team – in treating each patient (DiazGranados, Dow, Perry, & Palesis, 2014). Complex military operations require the closely coordinated action of multiple teams – in the field as well as in the "back office" – often spanning organizational and national boundaries (Goodwin, Essens, & Smith, 2012). Space exploration missions rely on a network of ground

teams to prepare, monitor, and support every step in the work of the space crew (Mesmer-Magnus, Carter, Asencio, & DeChurch, 2016). All of these are examples of multiteam systems – "tightly coupled network[s] of teams" that "need to coordinate their efforts to achieve one or more goals in addition to those of the component teams" (Luciano, DeChurch, & Mathieu, 2018: 3; Mathieu, Marks, & Zaccaro, 2001).

The success of such multiteam systems critically depends on *inter-team coordination*, i.e., organizing and aligning interdependent activities across team boundaries (de Vries, Walter, van der Vegt, & Essens, 2014; DeChurch & Marks, 2006), and, especially, on inter-team information sharing, a core aspect of coordination (Marks, Mathieu, & Zaccaro, 2001). This is most evident when information sharing fails. For instance, insufficient inter-team communication in new product development projects has been shown to compromise the quality of the product and result in significant financial and reputational damages (Gokpinar, Hopp, & Iravani, 2010). Similarly, in healthcare settings, gaps in information sharing during patient handoffs between medical teams have been shown to result in adverse clinical consequences for patients (Horwitz, Moin, Krumholz, Wang, & Bradley, 2008; Luciano, 2017).

A key factor affecting inter-team coordination and information sharing is members' social identity. Social identity theory (Tajfel & Turner, 1986) and its extension, the self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), suggest that an individual's self-concept partly "derives from his knowledge of his membership of a social group together with the value and emotional significance attached to that membership" (Tajfel, 1978: 63). Such self-concepts become behaviorally relevant as individuals who strongly identify with a group show more commitment and cooperation towards fellow members of that group than towards out-group members (Ashforth, Harrison, & Corley, 2008). However, just as in any fairly complex

organization, a member of a multiteam system is simultaneously member of multiple nested groups – the more proximal component team and the overarching multiteam system. These multiple memberships offer multiple *foci of identification* (van Knippenberg & van Schie, 2000).

Recent work highlights the importance of members' identification with the superordinate focus – e.g., the organization or the multiteam system – for inter-team coordination and effectiveness (Cuijpers, 2011; de Vries et al., 2014; Dokko, Kane, & Tortoriello, 2014; Lomi et al., 2014; Richter, West, van Dick, & Dawson, 2006). While these insights advance our understanding of the role of social identity for inter-team processes and effectiveness, they share a critical blind spot in ignoring that component teams within the same system can differ in the extent to which either the team or the multiteam system is their more salient focus of identification.

Variation in identity foci can have different sources. For example, in a new product development project, some modules typically have more physical and functional interfaces with other modules than others (Gokpinar et al., 2010). Teams working on these modules might thus be more aware of the interdependent nature of the team network as a collective system – the multiteam system membership becomes more salient for these teams than for teams working on modules with fewer interfaces (Connaughton, Williams, & Shuffler, 2012). As another example, in a space exploration mission, the physical and social isolation of the space crew from the ground teams may make the team itself a more salient focus for the space crew while the ground teams may identify most with the overarching system and its goals. In sum, variation in identity foci is likely prevalent in multiteam systems – and yet, to date we have little theory and empirical insight into how different configurations of identity foci affect inter-team collaboration.

The limited insight into the consequences of variation in identity foci for inter-team

collaboration is the more striking in view of prior research that elucidates antecedents that can lead to differences in identification *within* groups and examines consequences thereof. For instance, drawing on social identity and self-categorization theories, the relational demography literature has shown how a team's configuration of similarity and dissimilarity on demographic, occupational, or work status attributes can result in group members differentially identifying with different targets – i.e., the team versus their demographic, occupational, or work status category (e.g., Chattopadhyay, George, & Lawrence, 2004; George & Chattopadhyay, 2005). These differences in identification, in turn, have been shown to result in asymmetrical individual level attitudes and behaviors towards the team including interaction patterns, trust, organizational citizenship, and perceptions of conflict (e.g., Chattopadhyay, 1999; Chattopadhyay, George, & Shulman, 2008; George, Chattopadhyay, & Zhang, 2012).

The present paper, while building on the same theoretical foundation as this prior work, goes beyond it not only in shifting the level of analysis, but also in spelling out the mechanisms governing the dyadic interaction between teams as a function of the specific configuration of identity foci in a team dyad. More specifically, this paper explores the organizational consequences of *identity asymmetries* in multiteam systems – that is, situations in which interdependent component teams differ in what entity (the more proximal component team or the more distal overarching system) constitutes their primary focus of identification. Drawing on social identity and self-categorization theories, we develop theory about the effect of identity asymmetries on inter-team information sharing as an important facet of inter-team coordination (Marks et al., 2001) and inter-team performance, i.e. the achievement of team goals that require interdependent work with other teams. We argue that different identity foci result in different motives underlying interaction with other component teams: While a team focus elicits

instrumental motives rooted in a desire to enhance team welfare by means of conditional cooperation with other teams, a system focus elicits more benevolent motives rooted in a desire to enhance shared welfare (Biel & Thøgersen, 2007; Chatman & Flynn, 2001; Goette, Huffman, & Meier, 2006; Kerr, 1995). We further propose that while either logic can sustain a productive collaborative relationship between two teams when both teams act based on similar motives, identity asymmetries will disrupt inter-team coordination and, as a consequence, inter-team performance. We test these predictions in a laboratory experiment involving 84 teams (252 team dyads) nested in 21 multiteam systems. In a second study, we test the assumptions about the underlying motivational mechanisms, positing that team-focused individuals adopt more instrumental motives toward inter-team interaction. Finally, building on our findings, we conduct a simulation study to consider the implications of identity asymmetries for system-level coordination and performance given different compositions of the system in terms of identity foci.

This study makes several contributions to the literature. First, it provides causal evidence for the role of identity asymmetries for inter-team information sharing and performance in multiteam systems. Second, by creating a better understanding of how identity asymmetries affect inter-team collaboration and multiteam system functioning, it challenges the often-held assumption of a straightforwardly linear positive relationship between superordinate identification and inter-team processes and system performance. Third and more broadly, the analysis of distinct identity configurations and their effects extends fundamental theory on social identity and intergroup relations, highlighting identity composition as a characteristic that, while having significant implications for multiteam system functioning, has hitherto been largely overlooked.

THEORETICAL BACKGROUND AND HYPOTHESES

Informational interdependence, which exists when one team (the "seeker") requires information from another team (the "source") for the pursuit of its goals, is an important facet of interdependence among component teams of a multiteam system. Collaboration between teams who are informationally interdependent requires boundary-spanning communication and, in particular, *information sharing* as critical coordination processes. Inter-team information sharing is a team-level activity emerging from individual behavior as teams collectively organize their boundary-spanning interaction (Marrone, 2010). It can be initiated either by the source or the seeker. In the first case, the source shares information with the seeker without a request, i.e. *proactively*. Proactive information sharing constitutes a prototype of implicit coordination: The source anticipates the needs of the seeking team and acts upon them without a need for an explicit request (Fisher, Bell, Dierdorff, & Belohlav, 2012; Rico & Sánchez-Manzanares, 2008: 165). In the second case, the source shares information with the seeker in response to a request from the seeker, i.e. *reactively*. Reactive information sharing constitutes an explicit coordination mechanism in the sense that the information sharing activity itself is explicitly negotiated between the teams through the preceding request. While both explicit and implicit coordination generally have positive performance implications, their antecedents as well as their relative contribution to collective performance may differ (Espinosa, Lerch, & Kraut, 2004) and we therefore consider them side by side as we develop our theory.

Inter-team information sharing has been recognized as a critical foundation of inter-team effectiveness across different fields of research (Best Jr., 2011; Gokpinar et al., 2010; Horwitz et al., 2008). At the same time, it is an inherently challenging activity. Even within teams, information is often exchanged less than needed (Mesmer-Magnus & DeChurch, 2009) and team boundaries only further limit inter-team communication and information exchange (Caimo &

Lomi, 2015; Feld, 1981; Lomi, Lusher, Pattison, & Robins, 2014). In the following sections, we examine the role of social identity as a key factor that can help multiteam systems to overcome this challenge.

Social Identity in Multiteam Systems

The social identity and self-categorization theories (Tajfel, 1978; Tajfel & Turner, 1986; Turner et al., 1987) suggest that an individual's memberships in organizational groups such as the organization itself as well as workgroups, teams, divisions, or job categories nested within the organization inform his or her self-concept (Hogg & Terry, 2000). To the extent that the group membership is salient and valuable to individuals – that is, to the extent that they strongly identify with the group – they perceive members of that group as their in-group and members of other groups as out-group members. Behaviorally, this typically results in in-group members receiving preferential treatment: Individuals who strongly identify with a group show more cooperation towards in-group members than towards out-group members (Ashforth et al., 2008; Brewer, 1979; Hewstone, Rubin, & Willis, 2002). However, in almost any organization and – very prominently – in any multiteam system, individuals are simultaneously members of multiple groups which provide multiple foci of identification (van Knippenberg & van Schie, 2000). In a multiteam system, members have two main foci – the component team and the overarching system in which the teams are nested. These two foci can have different degrees of salience to an individual and their relative salience shapes what an individual perceives as the primary boundary between in- and out-group (Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993; Hogg & Terry, 2000). Below, we will refer to individuals who perceive the boundary around the component team as the primary boundary separating in- and out-group as *team-focused* and to individuals who perceive the boundary around the multiteam system as the primary boundary as *system-focused*.

Differences in what is perceived as in- and out-group boundaries result in differences in behavior towards other component teams. Earlier research has shown that, generally, more proximate foci tend to be more salient to individuals than more distal foci (Riketta & van Dick, 2005; van Knippenberg & van Schie, 2000). As a result, individuals working within a multiteam system tend to prioritize activities directed towards their own team over activities directed towards other teams. This, however, can be an impediment in the multiteam system context where teams require intense inter-team coordination. A seemingly straightforward remedy, then, is to foster a system focus in the component teams, thus extending the perceived in-group to include members of other component teams (Gaertner et al., 1993). Indeed, prior work highlights the importance of members' identification with a superordinate focus for inter-team coordination and effectiveness. For instance, prior research has found that identification with a superordinate focus increases the likelihood that individuals will interact and cooperate with members of other teams (de Vries et al., 2014; Dovidio et al., 1997; Kramer & Brewer, 1984; Lomi et al., 2014; Richter, West, van Dick, & Dawson, 2006; van Dick, van Knippenberg, Kerschreiter, Hertel, & Wieseke, 2008; Wit & Kerr, 2002). Furthermore, individuals who identify with a superordinate focus have been shown to be more attentive to and to make more use of information they obtain from members of other groups (Dokko, Kane, & Tortoriello, 2014; Kane, 2010; Kane, Argote, & Levine, 2005). On a system level, systems whose component teams share a superordinate identity focus have been found to collaborate more effectively (Cuijpers, Uitdewilligen, & Guenter, 2016) – albeit, in an interesting counterpoint, recent work found the opposite (Porck et al., 2019).

Two critical assumptions are, to varying degrees, inherent in this line of research. The first assumption is that what constitutes the primary identity focus varies across but not within

multiteam systems. This assumption is most explicit in research where measures of social identification are aggregated to the system level (Cuijpers et al., 2016; Porck et al., 2019). Yet, members of different component teams are embedded in different local contexts and subgroups and are exposed to different localized factors that can affect the relative salience of the team versus the multiteam system identity. For example, teams may have different positions in the geographical arrangement or in the workflow of the multiteam system and, hence, have different exposure to shared tasks and problems (Bartel, Wrzesniewski, & Wiesenfeld, 2011; Davison, Hollenbeck, Barnes, Sleesman, & Ilgen, 2012; Hinds & Mortensen, 2005). Teams may also differ in status (Chattopadhyay, Tluchowska, & George, 2004; Tajfel & Turner, 1986), in the extent to which team goals are compatible with other teams' and multiteam system goals (Rico, Hinsz, Burke, & Salas, 2017), or in team leaders' rhetoric and behavior (Shamir, Zakay, Breinin, & Popper, 1998). To the extent that these antecedents alter the relative salience of team and system boundaries, they can result in asymmetries in what members of different component teams perceive as their primary foci of identification. We argue that, given the many possible antecedents, asymmetries in identity foci between teams are not only possible, but even probable.

The second implicit assumption in this line of research is that, even where differences in social identification between interacting parties exist, they are not consequential to the interaction between these parties. This assumption is implicit in research that considers a focal individual's or group's behavior towards another group as a function of the former's – but not the latter's - social identification (de Vries et al., 2014; Dovidio et al., 1997; Hornsey & Hogg, 2000; Kane, 2010; Kane et al., 2005; Kramer & Brewer, 1984; Richter et al., 2006; van Dick, van Knippenberg, Kerschreiter, et al., 2008; Wit & Kerr, 2002). It remains present even in research that considers social identification of both parties – for instance, of both the information

seeker and of the information source – but without recognizing that the effect of one party's identity focus may be conditional on the identity focus of the other party (Dokko et al., 2014; Lomi et al., 2014). In contrast, we argue that identity asymmetries between component teams have important and unique consequences for inter-team information sharing and performance.

Social Identity Asymmetries and Proactive Information Sharing Between Teams

Cooperative inter-team behavior – such as proactive information sharing – can be based on different motives that range between self-interested instrumentality and other-interested benevolence. Following prior work, we use the term *benevolence* in a broad sense, describing actions that are pro-social in the sense that they aim at enhancing the welfare of a relevant overarching collective that encompasses self and other (Biel & Thøgersen, 2007: 102; Bolino & Grant, 2016). Thus, teams whose members are motivated by benevolence may share information with other teams because this contributes to the shared welfare of the overarching system, even if it may come at a cost to its intra-team-directed activities (Biel & Thøgersen, 2007; Chatman & Flynn, 2001). Information sharing guided by a benevolence motive is not conditional on the behavior of the direct recipient but rather follows a logic of *generalized* reciprocity. It is based on the assumption that others – who are not necessarily the direct recipients of their contribution – will equally cooperate in the future (Baker & Bulkley, 2014; Bearman, 1997; Molm, Collett, & Schaefer, 2007). Teams whose members are motivated by instrumentality, on the other hand, may share information with another team as a way to ensure that specific team's reciprocal cooperation. Such information sharing follows a logic of *direct* reciprocity which may be viewed as "a form of 'conditional kindness' whereby advice is given under the expectation that it will be received" (Caimo & Lomi, 2015: 671; Fehr & Gächter, 2000).

Prior research has shown that intra- and intergroup relations tend to be guided by different motives. Because the perception of belonging to the same group implies a concern for shared

welfare and, thus, a motivation to ensure the success of not only self but also that of fellow group members, direct reciprocation is not necessary to motivate cooperative action towards an in-group member (Flynn, 2005). Correspondingly, empirical research has shown that the perception of belonging to the same group elicits benevolence towards in-group members and expectations of generalized reciprocity (Goette et al., 2006; Yamagishi & Kiyonari, 2000). The very same concern for the welfare of the in-group, however, implies a stronger focus on the instrumental value of interactions with those who are perceived as out-group members. Correspondingly, advice and knowledge exchange relationships between members of different organizational groups have been shown to be governed more strongly by direct reciprocity than intra-group relationships (Brennecke & Rank, 2016; Caimo & Lomi, 2015).

Because differences in identity focus imply differences in where the subjective boundary between in and out-group is drawn, multiteam system members that differ in identity foci will likely differ in how they approach relations with members of other component teams. While individuals with a team focus will view relations with members of other component teams as inter-group relations, system-focused individuals will perceive members of other component teams as in-group members and so they are likely to approach inter-team relations as they would intra-group relations. As a result, the behavior of team-focused teams towards other component teams is likely to be guided by more instrumental motives: Cooperation with other component teams is a means to an end and conditional on its instrumental value. Conversely, the behavior of system-focused teams towards other component teams is likely to be guided by more benevolent motives: Cooperation with other component teams is an end in itself and not conditional on its instrumental value. This difference has multiple implications for inter-team information sharing.

First, both motives can, in principle, result in sustained cooperation. Members of team-

focused teams will invest resources in proactively sharing information with another team if they assume and observe that the other team's information sharing is conditional on their own behavior. Early work on individuals' behavior in social dilemmas corroborates this line of reasoning: When interacting with an opponent who used a reciprocity-oriented tit-for-tat strategy, individuals primarily focused on maximizing their own utility showed similar levels of cooperative behavior as individuals focused on maximizing the shared utility (Kuhlman & Marshello, 1975). Analogously, two teams who both have a team focus are likely to engage in sustained proactive sharing as both perceive the likelihood of receiving information from the other party as conditional on their own proactivity.

Second, when two teams differ in their primary focus of identity, we have no reason to expect that members of a system-focused team would share information differently with the team-focused team than they would with any system-focused team. Because they perceive the superordinate membership as more salient, their behavior towards other teams will be more strongly guided by benevolence. Thus, we can expect that their information sharing with other teams would be as open, unconditional, and proactive as if they were members of the same team.

Third, and most importantly: The team-focused team in such an asymmetric dyad may behave quite differently. As described above, for a team-focused team, sharing information with another team is more of a means towards the end of obtaining information necessary for the pursuit of team goals rather than a behavior driven by concern for shared goals. Realizing over the course of the interaction with a system-focused team that the other party's cooperation is not contingent on their own behavior, the team-focused team is likely to shift its attention and resources towards other demands. While they may still respond to direct requests, they will be less likely to invest the additional effort of anticipating the other team’s needs required by

proactive information sharing. Again, we can draw a parallel to individuals' behavior in social dilemmas: While individuals concerned with shared welfare show cooperative behavior both towards opponents who use a reciprocal tit-for-tat strategy and those who consistently and unconditionally cooperate, individuals primarily concerned with their own utility show considerably lower levels of cooperation towards opponents that cooperate unconditionally than towards opponents who reciprocate both positive and negative behaviors (Kuhlman & Marshello, 1975). Correspondingly, we expect that in the presence of an identity asymmetry, a team-focused source team will reduce its level of proactive information sharing towards a system-focused seeking team relative to a team-focused seeking team. More formally:

Hypothesis 1a: There is an interaction between the source team's and the seeking team's identity focus such that team-focused source teams are less likely to proactively share information with system-focused seeking teams than with team-focused seeking teams.

Social Identity Asymmetries and Reactive Information Sharing Between Teams

While we expect that team-focused source teams engage in less proactive information sharing towards system-focused seeking teams, we expect the opposite dynamic to arise with regard to reactive sharing. Our argument here rests on two assumptions. First, prior work has suggested that explicit and implicit coordination are inversely related: When implicit coordination is established, the need for explicit coordination decreases (Espinosa et al., 2004; Rico & Sánchez-Manzanares, 2008). In the context of information sharing this means that the more information a source team shares with the seeking team proactively, the less the seeking team will have to ask the source team for information. Conversely, this also means that the less information a source team shares with the seeking team proactively, the more the seeking team will need to ask the source team in order to obtain the information they need. Thus, essentially as a side effect of team-focused source teams sharing less information with system-focused seeking teams proactively, system-focused seeking teams will extend more information requests towards

team-focused source teams. Furthermore, although there is, of course, also a probability that a source team chooses not to respond to an information request, work on knowledge hiding has shown that denying explicitly requested information is a very rare behavior (Connelly, Zweig, & Webster, 2012). Thus, our second assumption is that most requests that are made are also responded to. Therefore, we expect that the increase in requests will be directly visible in an increased proportion of reactively shared information by team-focused source teams towards system-focused seeking teams as compared with towards team-focused seeking teams. In sum,

> *Hypothesis 1b. There is an interaction between the source team's and the seeking team's identity focus such that team-focused source teams are more likely to reactively share information with system-focused seeking teams than with team-focused seeking teams.*

Social Identity Asymmetries, Information Sharing, and Inter-team Performance

Inter-team information sharing is consequential to multiteam systems because, in the context of informational interdependence among the component teams, it directly impacts inter-team performance. We define inter-team performance as a dyadic, directed construct that captures the extent to which a specific focal team succeeds in achieving goals that require the collaboration of a specific partner team. In our context, we consider the performance of a seeking team (this is the focal team) on tasks that require information from a specific source team (this is the partner team). Inter-team performance is distinct from what we might call "intra-team performance" in that inter-team performance excludes from consideration the extent to which a focal team achieves goals for which they do not rely on other teams. Furthermore, inter-team performance is a directed construct in the sense that in a dyad where both teams are mutually dependent on each other, team A may be more (or less) successful on goals that require team B's collaboration than team B is on goals that require team A's collaboration.

The arguments in the preceding section imply that where there is an identity asymmetry between the seeking and the source team, inter-team coordination shifts from implicit

coordination based on proactive information sharing to explicit coordination based on reactive information sharing. Both routes are, in principle, effective coordination mechanisms – as long as a team obtains the information it needs, it can proceed to utilize this information in its goal-directed activities. Thus, both proactive and reactive information sharing should have positive implications for inter-team performance. More formally:

Hypothesis 2a. Proactive information sharing has a positive effect on inter-team performance.

Hypothesis 2b. Reactive information sharing has a positive effect on inter-team performance.

While proactive as well as reactive information sharing should contribute to inter-team performance, the search and negotiation activities involved in reactive information sharing make this form of explicit coordination more costly (Rico & Sánchez-Manzanares, 2008). While a team is dedicating resources to searching for relevant information, these resources are not available for putting the obtained information into action. Thus, at least in a setting where it is relatively clear who may need to know what (a boundary condition we examine at greater detail in our discussion section), proactive information sharing is arguably a more effective inter-team coordination mechanism than reactive information sharing. Because of this, we expect that proactive information sharing will have a stronger positive impact on inter-team performance.

Hypothesis 3. Proactive information sharing has a stronger positive effect on inter-team performance than reactive information sharing.

Together, the core logic underlying Hypotheses 1 – 3 describes how the effect of the identity foci of source and seeker teams affects inter-team performance. This logic suggests two mediators, proactive and reactive sharing. Hypothesis 1 posits the interaction between the source team's and the seeking team's identity focus affects the probability that they engage in proactive or reactive information sharing respectively. Hypothesis 2 posits both types of information-

sharing are positively related to inter-team performance, but that, in Hypothesis 3, the positive effect of proactive information sharing is stronger than that of reactive information sharing. Taken together, this implies that the configuration of the identity foci between the source and seeker teams indirectly affects inter-team performance by influencing the extent to which the teams engage in proactive and in reactive information sharing, and that the indirect effect via proactive information sharing would be stronger than that via reactive information sharing.

> *Hypothesis 4a. There is an indirect effect of the interaction between the seeking team's and the source team's identity foci on inter-team performance, mediated by proactive information sharing.*
>
> *Hypothesis 4b. There is an indirect effect of the interaction between the seeking team's and the source team's identity foci on inter-team performance, mediated by reactive information sharing.*
>
> *Hypothesis 5. The indirect effect of the interaction between the seeking team's and the source team's identity foci on inter-team performance mediated by proactive information sharing is stronger than the indirect effect of the interaction between the seeking team's and the source team's identity foci on inter-team performance mediated by reactive information sharing.*

Our arguments thus far suggest that dyads without identity asymmetries would achieve higher inter-team performance as a result of relying more on proactive rather than on reactive information sharing. As prior research shows, however, identification with the superordinate group (in our context, this is the multiteam system) not only affects the sharing of information but also makes a team more receptive to external information, thus increasing the rate at which it will be utilized (Dokko et al., 2014; Kane et al., 2005). That is, while symmetric team-focused dyads may exchange information at a similar rate as symmetric system-focused dyads, the higher information utilization rate by system-focused teams that has been established in prior work leads us to expect that symmetric system-focused dyads will perform at a higher level than dyads in which either one or both of the parties have a team focus. In sum:

Hypothesis 6. Inter-team performance is higher when both teams (seeking and source team) have a system focus than when either seeking, source, or both teams have a team focus.

STUDY 1: EXPERIMENTAL INVESTIGATION OF IDENTITY ASYMMETRIES IN MULTITEAM SYSTEMS

In order to test our hypotheses, we conducted a laboratory experiment using a computer-based, team-based, dynamic strategy simulation, manipulating the focus of identification between component teams nested in multiteam systems. Simulations of this kind are widely used in research on teams and multiteam systems as they allow controlled experimentation, structured behavioral observation, and objective measurement of process and performance (Beersma et al., 2003; DeChurch & Marks, 2006; Ellis, 2006; Homan et al., 2008; Lanaj, Foulk, & Hollenbeck, 2018; Lanaj, Hollenbeck, Ilgen, Barnes, & Harmon, 2013; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Pearsall & Venkataramani, 2015; Porck et al., 2019). Such simulations are also widely used to teach teamwork, coordination, and leadership, for example, in military training (Beersma et al., 2003) and business education (Pearsall & Venkataramani, 2015). While simulations naturally abstract from the highly complex and specialized knowledge required in the field and use student rather than field samples, the team processes that participants experience and the interpersonal and intergroup behaviors they engage in during such simulations are generally deemed useful analogues to the processes and behaviors in the field. Correspondingly, meta-analytic evidence shows that lab and field settings yield parallel findings with respect to relationships relevant to our study, such as relationships between team identity and team performance (Mesmer-Magnus, Asencio, Seely, & DeChurch, 2018) as well as relationships between teamwork processes and team performance (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008).

Sample

The initial sample consisted of 440 individuals (188 female, 252 male) who were recruited from the college and senior high school population within and in the neighborhood of a large mid-western university in the US. Participants were between 16 and 35 years old (M = 21.32, SD = 3.64). Fifty percent reported Caucasian ethnic background, 20% Asian, 12.6% African American, and 11.7% Hispanic. Participants were assigned to one of 22 multiteam systems, each consisting of four component teams of five members each. They received $35 for their participation. Due to a computer error, one session's record of participants' actions in the simulation was lost. This did not affect their experience nor the survey data collection and hence we use the data from the full sample for the manipulation checks. For our main analyses that involve data on actions within the simulation, however, we work with the reduced sample of 420 participants nested in 21 multiteam systems.

Experimental Task

In order to test our predictions experimentally, we required a task with a number of specific characteristics. First, the task must contain goals at the team-level as well as at system level. Second, teams must be linked by informational interdependence – i.e., require information from other teams in the pursuit of their goals. Third, the task must allow us to capture rich data on all participants' task-related activity and communication. Based on these criteria, we developed a platform on the basis of a computer-based multi-player strategy simulation.

The multiteam systems' collective goal was to safely direct a humanitarian aid convoy along a predefined route through a war-torn region represented by a map divided into 100 cells. Seventy-five threats distributed across the map could damage the convoy unless they were flagged and neutralized prior to moving the convoy to the affected cell. Each of the four component teams could only flag and neutralize threats located in their own district comprising

25 cells on the map. Each district contained between 17 and 20 threats. Each participant furthermore had a specific role allowing him or her to perform particular actions in the simulation. "Reconnaissance officers" were responsible for flagging threats, while "field specialists" were responsible for neutralizing flagged threats and marking safe cells. Intelligence containing information necessary for flagging and neutralizing threats (i.e., type of threat, cell, and specific coordinates within the cell) was distributed among reconnaissance officers and field specialists of all four component teams such that only about a quarter of the information required by any single team was given to members within that team. The remaining items of information were distributed across members of the three other teams, such that each team required four or five items of information from each other team. Finally, each team contained one leader who was responsible for moving the convoy in coordination with the leaders of the other teams. Given the special position and the different task set of leaders, they did not receive any intelligence items at the beginning of the mission.

In sum, in order to progress towards the system-level goal of safely moving the convoy, participants had to a) exchange information such that relevant intelligence reached the teams and individual members who needed it, b) flag the threats based on the intelligence, c) neutralize the flagged threats, and d) move the convoy once the next steps of the route are declared safe. In other words, multiteam system success was critically dependent on effective collaboration and information exchange between the interdependent teams as well as on the teams' successful utilization of the received information.

Procedure

Upon arrival, participants were randomly assigned to one of the twenty roles in the multiteam system. They were seated at individual workstations, each team in a separate room, and viewed an instruction video about the goals and the gameplay of the simulation. The videos

were identical for each team up until a final segment which contained the first part of the identity manipulation. As a second part of the manipulation, following the instruction, participants engaged in a virtual banner-making exercise. We describe these elements in the "Manipulation" section. Next, participants filled in a brief survey, discussed strategies during a five-minute planning phase, and played a practice mission of fifteen minutes during which they could consult research assistants about the interface so as to ensure complete understanding of the gameplay. The practice mission was followed by a brief survey and a break. After the break, participants discussed strategies during a seven-minute planning phase. Prior to beginning the main mission, they watched another brief video in their rooms which aimed to recall and reinforce the identity manipulation. Then, they had 40 minutes for the main mission which was followed by a final survey. The entire procedure lasted about 3.5 hours. During both missions, each participant could communicate with any other participant using one-on-one Skype chat and calls. We recorded and transcribed all communication during the missions as well as all actions taken by participants in the simulation. We use the data from the main mission to test our hypotheses.

Manipulation

We manipulated the identity focus within multiteam systems such that two teams of each multiteam system were placed in the "team focus" condition and two teams were placed in the "system focus" condition. As a result, in each multiteam system we obtained all four possible team-dyadic identity focus configurations: Of the twelve directed ties in each four-team network, in two directed dyads both seeker and source had a team focus, in two directed dyads both seeker and source had a system focus, in four directed dyads the seeker was team-focused while the source was system-focused, and in four directed dyads the seeker was system-focused while the source was team-focused.

For our manipulation we combined multiple elements used in prior experimental research

aiming to instill a sense of shared identity with and attachment to a group (Cuijpers et al., 2016; De Cremer, van Knippenberg, van Dijke, & Bos, 2006; Eckel & Grossman, 2005; Gaertner, Mann, Murrell, & Dovidio, 1989; Kane et al., 2005; Kramer & Brewer, 1984). These elements included (i) video vignettes emphasizing common fate with and emotional attachment to the team or to the multiteam system, (ii) a banner-making exercise in which participants created a banner and a slogan for their team or for the multiteam system, and (iii) symbols of intergroup comparison with other teams or with other multiteam systems.

Video vignettes. In the video vignettes, participants were introduced to a background story about their engagement whose emphasis differed depending on the condition. In the system-focus condition, the videos focused on the values and history of the greater region and participants' shared history of collaboration with the community in the region. The videos emphasized to the participants the notions of commitment, solidarity, and a sense of unity with the "platoon" – i.e., the multiteam system – and stressed that these shared experiences and achievements distinguished their platoon from other platoons operating in other regions (i.e., other hypothetical multiteam systems). In the team-focus condition, participants were shown an identical background story with the difference that it revolved around their district, emphasizing a sense of unity with the "squad" – i.e., their team – and contrasting this with other squads.

Banner-making exercise. Prior to the practice mission, participants designed a banner and a slogan for their squad or their platoon using a virtual whiteboard app that allowed collaborative drawing and chatting using individual tablets. Participants in the team-focus condition were only connected with members of their own team and designed a banner and a slogan for their own squad. Participants in the system-focus condition were also connected with members of the other system-focused team and designed a banner and a slogan for the entire platoon. In order to

sustain the illusion that they were, in fact, connected with members of all teams rather than just one additional team, we set up anonymous numbers as chat names. The banners continued to be displayed on large screens in their respective rooms for the duration of both missions.

Symbols of intergroup comparison. To further reinforce a sense of distinctiveness of the team or the multiteam system, we placed a large poster in each room which displayed a fictitious ranking of the three best-performing squads or platoons, depending on the condition.

Measures

Manipulation checks. We conducted manipulation checks at three points in time. The first manipulation check took place immediately after the instructions and manipulation, prior to the practice mission. The second check took place after the practice mission. The third check took place after the main mission. As manipulation checks, we asked participants to rank their "squad" (i.e. team), their "platoon" (i.e. multiteam system), and a fictitious superordinate "battalion" (that would include other platoons) in terms of how strongly they identified with each. This measure directly captures the relative salience of the different identity foci. We then constructed an indicator variable taking the value of 1 when participants ranked the multiteam system more highly than their team (i.e., displaying a system-focus) and 0 otherwise.

Inter-team performance. In the simulation, informational dependence arises from threats located in a seeking team's district about which another source team received information. We operationalized inter-team performance as the successful neutralization of such threats. That is, for each threat located in a seeking team's district and initially known to another source team, we recorded 1 if the seeking team successfully neutralized it and 0 otherwise.

Reactive information sharing. First, we identified all messages in the communication transcripts that contained an item of intelligence. We then coded all instances in which the item was provided to the other participant in response to an immediately preceding request. As our

measure of reactive information sharing, for each threat located in a seeking team's district and initially known to another source team we recorded 1 if the information regarding this threat had been reactively provided by the source team to the seeking team and 0 otherwise.

Proactive information sharing. We coded the remaining messages in which one participant provided intelligence to another participant without an immediately preceding request as instances of proactive information sharing and recorded 1 for each threat about which information was proactively provided by the source team to the seeking team and 0 otherwise[1].

Analytical Approach

Our set of observations consists of 1176 threats nested in 252 directed dyads of source and seeking team, which, in turn, are nested in 21 multiteam systems. Because all of our dependent variables (proactive and reactive information sharing and inter-team performance) are binary variables, we estimated generalized linear mixed models (GLMMs with probit link), including random effects for seeker, source, and multiteam system in order to account for interdependence between observations. We carried out these analyses with the lme4 package (Bates, Mächler, Bolker, & Walker, 2015) in R (R Core Team, 2016).

Results

Manipulation checks. The results of three generalized linear mixed models accounting for nesting of participants within teams and multiteam systems showed that participants in the system focus condition were consistently more likely to report a system focus than participants in

[1] A small percentage of interdependent threats (5.8 %) were neutralized even though we did not record the transfer of the related information from source to seeking team. A reexamination of the research logs suggested that this was primarily due to participants' broadcasting information through the status function of the software. Thus, a small part of the information was shared through an unrecorded channel. A perusal of the communication logs suggested that this behavior emerged through imitation of other participants' information sharing behavior rather than through explicitly coordinated requests to use the status function in this manner. Thus, we coded cases where a record of the information transfer was missing despite evidence of a transfer having taken place as proactively shared. Robustness checks in which we (a) coded proactive information sharing without this imputation or (b) treated these cases as missing observations yielded identical conclusions to the analyses reported below.

the team focus condition (Time 1: $b = 0.85$, $SE = 0.28$, $p = 0.001$; Time 2: $b = 0.38$, $SE = .23$, $p = 0.047$; Time 3: $b = 0.61$, $SE = .24$, $p = 0.005$; all one-tailed[2] tests of the directional hypothesis that system focus [system focus condition] > system focus [team focus condition])[3]. That is, our system focus manipulation successfully increased the relative salience of the multiteam system identity vis-à-vis the team focus manipulation[4].

Hypothesis tests. Table 1 presents descriptive statistics while Table 2 shows the results of the hypothesis tests. In the regressions, we used contrast coding for the identity focus conditions (system focus = +0.5, team focus = -0.5) as this allows for the straightforward interpretation of the regression parameters as main effects and interaction rather than conditional effects.

---------- Insert Tables 1 and 2 about here ----------

Model 1 tests the effects of seeker and source focus of identification on proactive information sharing. We found a statistically significant interaction between seeker and source team identity focus. To test Hypothesis 1a, we computed a linear contrast between two cells: team-focused seeker & team-focused source vs. system-focused seeker & team-focused source. As predicted, team-focused sources shared less information proactively with system-focused seekers than they did with team-focused seekers ($b = 0.33$, $SE = 0.13$, $p = 0.015$, one-tailed).

In Model 2, we examined the effect of seeker and source focus of identification on reactive

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[2] Throughout our manuscript, we use one-tailed tests for directional hypotheses. This is consistent with recommendations put forward in earlier research, noting that one-tiled tests provide a more precise logical correspondence between a directional research hypothesis and its statistical test (Cho & Abe, 2013; Gravetter & Wallnau, 2017; Schwab, 2005). Conversely, wherever we did not have a-priori directional hypotheses – e.g., in supplementary analyses – we used two-tailed tests.

[3] We note that the second manipulation check showed a considerably smaller effect size than the first and the third. One explanation for this is that the second manipulation check took place after the practice mission during which mastering the interface and experimenting with initial strategies took the forefront over the mission and the identity-relevant background story and context. Anticipating that this could weaken the manipulation in the absence of additional reinforcement, we had included the refresher video preceding the main mission and, indeed, at Time 3 we again observed a stronger effect of the manipulation.

[4] In supplementary analyses not reported here we also examined whether our manipulation affected perceptions of task interdependence, goal interdependence, and inter-team competition. We found no significant differences between conditions on any of these other variables.

information sharing. In contrast to Hypothesis 1b, there was no interaction between seeker and source focus of identification. We therefore did not proceed to probe the linear contrast.

Models 3 and 4 examine Hypotheses 2 to 5 which are related to inter-team performance. Consistent with Hypotheses 2a and 2b, Model 4 shows a positive effect of both proactive (b = 2.52, SE = 0.16) and reactive (b = 1.80, SE = .20) information sharing on inter-team performance. To test Hypothesis 3 about the relative impact of proactive vs. reactive information sharing on inter-team performance, we tested the equality of the two regression coefficients through a linear hypothesis test. In line with Hypothesis 3, we found that the effect of proactive sharing on inter-team performance was significantly stronger than the effect of reactive information sharing on inter-team performance (Chisq = 15.29, $p < 0.001$, one-tailed).

Hypotheses 4a and 4b posited an indirect effect of the interaction between seeker and source focus on inter-team performance, mediated by proactive and by reactive information sharing, respectively. In Model 3, we find a significant total effect of the interaction between seeker and source focus of identification on inter-team performance. To test the mediation hypotheses, we estimated a path model in Mplus (Muthén & Muthén, 2017), a statistical software capable of estimating and testing indirect effects in complex multilevel data. We used a cross-classified probit model accounting for the clustering of observations in seeker and source teams simultaneously[5]. By default, Mplus uses Bayesian estimation for cross-classified models. Figure 1 presents the results of the path model, replicating our prior analyses. The estimate for the indirect effect of the interaction between seeker and source identity foci on inter-team performance via proactive information sharing was 0.74, its 95% Bayesian credibility interval

[5] In contrast to our main analyses, we could not account for clustering in multiteam systems simultaneously with the cross-classified affiliation with seekers and sources in this software. However, supplementary analyses not reported here indicated that the conclusions of our main models presented in Table 2 were robust to the omission of the multiteam system clustering variable and we have no reason to expect any different in the path model.

[0.28;1.37] not including zero, thus supporting Hypothesis 4a. The estimate for the indirect effect of the interaction between seeker and source identity foci on inter-team performance via reactive information sharing, in turn, was -0.18, its 95% Bayesian credibility interval [-0.77;0.35] including zero, thus not supporting Hypothesis 4b. To test the directed Hypothesis 5 that the indirect effect via proactive information sharing would be stronger than the indirect effect via reactive information sharing, we computed 90% Bayesian credibility intervals around both indirect effects and examined their overlap in the expected direction. The 90% credibility interval around the indirect effect via proactive sharing [0.35;1.25] did not overlap with the 90% credibility interval around the indirect effect via reactive information sharing [-0.66, 0.25], thus supporting Hypothesis 5.

---------- Insert Figure 1 about here ----------

Finally, to test Hypothesis 6, we computed three linear contrasts comparing the seeker system focus / source system focus configuration with each other combination of conditions based on the total effects presented in Model 3. Consistent with Hypothesis 6, inter-team performance was higher when both teams had a system focus than when either seeker ($b = 0.37$, $SE = 0.14$, $p = 0.012$), source ($b = 0.30$, $SE = 0.13$, $p = 0.023$), or both had a team focus ($b = 0.28$, $SE = 0.17$, $p = 0.046$; all three comparisons were one-tailed tests using the Holm (1979) correction for multiple comparisons). A single linear contrast comparing the system-system configuration with all other configurations combined further yielded consistent evidence for higher performance of the system-system configuration as compared with all other configurations ($b = 0.31$, $SE = 0.12$, $p = 0.005$, one-tailed). Figure 2 presents the predicted means per condition based on the fitted models.

---------- Insert Figure 2 about here ----------

Supplementary analyses. To gain further insight into the role of social identity for information sharing, we conducted several supplementary analyses. First, as a check of one of the assumptions underlying Hypothesis 5 – namely that system-focused teams are more likely to utilize externally obtained information (Dokko et al., 2014; Kane et al., 2005) - we estimated the effects of our identity foci conditions on inter-team performance, conditional on information having been shared (Model 5 in Table 2). Consistent with prior research, we found that system-focused teams were marginally more likely to proceed to neutralize the threats whose location they obtained from other teams than were team-focused teams ($b = 0.28$, $SE = 0.16$, $p = 0.08$, two-tailed).

In a second supplementary analysis, we sought to understand to what extent a team's primary identity focus affected their intra-team performance, that is, the successful completion of tasks in which they did not depend on other teams. The argument here could be that system-focused teams' indiscriminate investment in inter-team cooperation may reduce performance on intra-team tasks, for instance as a result of depletion (Porck et al., 2019). In our study, intra-team performance is operationalized as the proportion of those threats about which information was given to the team that needed it from the start ($N = 399$) that was successfully neutralized. Team-focused teams neutralized 62.38 % of the threats initially known to them while system-focused teams neutralized 65.08%. We estimated a GLMM predicting neutralization of a threat as a function of six conditions: intra-team knowledge of the threat in combination with team focus of the focal team, intra-team knowledge in combination with system focus of the focal team, and the four conditions capturing inter-team knowledge together with the four different combinations of seeker and source focus. In contrast analyses, we found that performance did not differ between the two intra-team conditions ($b = -0.07$, $SE = 0.17$, $p = 0.97$). Combining both intra-

team conditions on the one hand, and all four inter-team conditions on the other hand, we found that – as could be expected – performance was higher in intra-team conditions than in inter-team conditions (b = 0.25, SE = 0.08, p = 0.01). Finally, we differentiated between the inter-team condition in which seeker and source had system focus and the three remaining inter-team conditions. We found no difference between the combined intra-team conditions and the inter-team condition in which both seeker and source had system focus (b = -0.01, SE = 0.13, p = 1), while the contrast between the two intra-team conditions and the remaining three inter-team conditions was significant (b = 0.32, SE = 0.08, $p < 0.001$; all two-tailed tests using the Holm (1979) correction for multiple comparisons). In sum, system focus did not constrain intra-team performance. Furthermore, while inter-team collaboration was more challenging than intra-team collaboration for most team dyads, those team dyads in which both partners had a system focus collaborated as effectively as if there had been no team boundary between them.

STUDY 2: IDENTITY FOCI AND MOTIVES TOWARD INTER-TEAM INTERACTION

The theory underlying our key hypothesis about how identity focus affects proactive information sharing is based on the assumption that identity focus changes the way in which team members approach collaboration with other teams: We argue that team-focused teams approach inter-team collaboration based on instrumental motives – cooperation is a means to an end and conditional on its instrumental value. Conversely, we argue that system-focused teams approach inter-team collaboration based on benevolent motives – cooperation is an end in itself and not conditional on its instrumental value. It is this mechanism, we argue, that underlies differences in information sharing behavior between team- and system-focused teams: Because team-focused teams approach inter-team cooperation more as a means to an end, they will orient their information sharing behavior more strongly on direct reciprocity considerations.

Although the behavioral differences we observed in Study 1 support these theoretical

arguments, Study 1 did not directly test this underlying assumption. To fill this gap and test our working assumption, we designed a scenario experiment inspired by the experimental task in Study 1. In this scenario, participants took the role of an intelligence officer operating as part of a multiteam system securing a city. We manipulated identity focus and then measured the impact of the manipulation on participants' conceptualization of inter-team relations as more or less instrumental, and their information sharing intentions.

Sample

We recruited 308 participants in the UK and USA through the online research platform Prolific Academic. Participants were paid £0.70 for a seven-minute study. Because prior research has raised concerns about response quality in online research, we included two comprehension checks and one instructional manipulation check at different points in our study (Berinsky, Margolis, & Sances, 2014; Fleischer, Mead, & Huang, 2015). Forty-six participants failed either both comprehension checks or the instructional manipulation check. Four additional participants provided responses not conforming to the rules set out by the scenario. We excluded these from the analyses. The resulting sample contained 258 individuals (134 men, 122 women, 2 did not self-identify). Participation was restricted to individuals reporting full-time employment. Participants were between 18 and 62 years old ($M = 34.40$, $SD = 9.70$).

Procedure

Participants read a scenario in which their task was described as gathering intelligence about potential threats to a city and redirecting this information to field specialists within the task force. The full scenario and the measures are reproduced in the supplement. The city was described as consisting of five districts with a different component team operating in each district. Each participant was told that they are part of Team Center operating in the Center District, but they could encounter intelligence about threats in any district. Following the general

introduction into the situation, participants read the identity manipulation which we adapted from prior research (De Cremer et al., 2006). Next, participants read the information sharing scenario in which they were told that they had obtained two pieces of information that were relevant to field specialists in two different teams, North and South. They furthermore learned that in the near future, Team North was very likely to obtain information relevant to Team Center (the participant's team) while Team South would most likely not obtain any information relevant to Team Center. Thus, from an instrumentality point of view, Team North appears as a more relevant target for information sharing than Team South as securing Team North's future reciprocal cooperation is more valuable for Team Center's own performance. From a benevolence point of view, on the other hand, there is no such difference as both teams' performance equally contributes to the shared welfare of the task force. Finally, participants responded to a questionnaire containing the measures of the dependent variables.

Measures

Manipulation check. As in Study 1, we measured participants' primary identity focus directly by asking them to rank the team and the multiteam system in terms of how strongly they identified with each.

Reciprocity-oriented information sharing. After reading the information sharing scenario, participants were asked to decide how to allocate their time between preparing memos for both teams. They were told that the higher percentage of time allocated to a memo, the more useful it would be to the other team. Given that Team North was presented as having more relevant information to offer to Team Center in the near future, higher time allocation to Team North at the expense of Team South can be interpreted as favoring reciprocity-oriented information sharing and was our dependent variable.

Instrumentality motive in inter-team interactions. To measure the extent to which

participants perceived collaboration with other teams as a means to an end, we adapted six items of Gruenfeld and colleagues' (Gruenfeld, Inesi, Magee, & Galinsky, 2008) objectification scale. A sample item is "The main reason why relationships with other teams would be important to me is because they help me accomplish my team's goals." Participants responded on a 5-point Likert scale (1 = "strongly disagree", 5 = "strongly agree"). The adapted scale showed acceptable internal consistency ($\alpha = 0.72$).

Results

Manipulation check. As intended, participants in the system-focus condition were more likely to report the system as their primary identity focus (78.4 %) than participants in the team-focus condition (16.1 %, $t = 12.77$, $p = <0.001$, one-tailed).

Main results. Table 3 provides a summary of the main results. As expected, participants in the team-focus condition reported higher instrumentality of inter-team relationships ($M = 3.40$, $SD = 0.66$) than participants in the system-focus condition ($M = 2.85$, $SD = 0.69$; $t = 6.63$, $p < 0.001$, one-tailed). Furthermore, participants in the team-focused condition showed higher levels of reciprocity-oriented information sharing ($M = 58.27$, $SD = 19.23$), than participants in the system-focused condition ($M = 53.54$, $SD = 19.99$, $t = 1.93$, $p = 0.03$, one-tailed). Finally, we conducted a mediation analysis using Hayes' PROCESS routine (Hayes, 2013). As predicted, instrumentality of inter-team interactions mediated the effect of identity focus on reciprocity-oriented information sharing ($b = -2.48$, the 95% confidence interval of the indirect effect [-4.63; -0.58] not including 0).

---------- Insert Table 3 about here ----------

STUDY 3: IDENTITY CONFIGURATIONS IN MULTITEAM SYSTEMS

Thus far, we have focused our investigation on the team-dyadic level, arguing that identity asymmetries will disrupt implicit coordination between teams and harm inter-team performance.

The results of Study 1 corroborate our line of reasoning, showing impaired information sharing and lower inter-team performance in team dyads consisting of a team-focused source and a system-focused seeker. This insight, in turn, allows us to consider the effect of social identity on system-level coordination and performance in a more precise manner than prior research by considering the implications of different *identity configurations* of multiteam systems.

A multiteam system's identity configuration is the composition of the system in terms of its teams' primary foci of identification. It can be captured, for instance, as the proportion of component teams whose primary identity focus is the multiteam system. Most prior research on the role of social identity in intergroup collaboration broadly suggests that identification with the overarching collective would have a (linearly) positive relationship with collective performance as it leads to more (Lomi et al., 2014) and more effective (Cuijpers et al., 2016; Dokko et al., 2014; Richter et al., 2006) interactions at the team boundaries. That is, based on prior work we should expect that the larger the proportion of system-focused teams in the system as a whole, the better this system should perform. However, if – as we found above – the benefit of multiteam system identification of a component team is conditional on the identity focus of the team it interacts with, then we may need to qualify this claim: If identity asymmetries disrupt dyadic coordination and performance, then configurations with a higher number of asymmetric dyads bear a disadvantage that can counteract the positive effect of higher system focus in a system.

To gain a better understanding of these interactions we conduct a third study in which we extrapolate from our empirical results on the team-dyadic level to develop propositions about team and system-level coordination and performance by means of computational simulation. The simulation method is particularly useful to understand the implications of different identity

configurations in multiteam systems as it enables us to conduct virtual experiments manipulating the proportion of team- and system-focused teams in a large number of simulated multiteam systems. Thus, we are able to gain insights not easily obtainable in the lab or in the field.

Simulation Procedure

In order to extrapolate from our results to the implications of different identity configurations in multiteam systems, we use the expected values obtained in our empirical models in Study 1 in a computational simulation mimicking multiteam systems engaged in a similar task. That is, we simulate multiteam systems in which teams have tasks (e.g., neutralize threats) for the completion of which they require information from other teams.

System setup. First, we generated synthetic multiteam systems. In keeping with Study 1, we modeled four-team multiteam systems. Going beyond Study 1, in this study we varied identity configurations to create five multiteam system configurations: 4T:0S, 3T:1S, 2T:2S, 1T:3S, and 0T:4S – the first number indicating the number of team-focused and the second number indicating the number of system-focused teams in each multiteam system. We generated 10,000 systems for each configuration. Next, in each system, we generated 100 items of information and "distributed" these among the teams by randomly assigning a seeker (i.e., the team who needs this item) and a source (i.e., the team who originally has this item) to each item.

Information sharing. In our simulation, each item of information has the opportunity to be shared proactively and the opportunity to be shared reactively with the seeking team. We assume that the probabilities of an item being shared in either manner depend on the combination of seeker and source identity focus. Each item is recorded as shared proactively with an item-specific probability p_{psi} and each item is recorded as shared reactively with an item-specific probability p_{rsi}. The probabilities are drawn from the distributions of expected values generated by Model 1 (proactive sharing) and Model 2 (reactive sharing) for the corresponding

combinations of seeker and source identity focus. We then combine these two events in a single record indicating whether or not an item has been shared by the source with the seeker. Finally, we calculate what proportion of information relevant to each team was actually obtained by that team (constituting a team level outcome) and we calculate what proportion of all information that could have been shared actually was shared (constituting a system level outcome).

Performance. Next, each item that has been successfully shared has an opportunity to be neutralized – i.e., the corresponding task may be completed. Among the items that have been shared, we record each item as successfully neutralized with an item-specific probability p_{ni} which we draw from the distribution of expected values generated by Model 5 for the corresponding combinations of seeker and source identity focus. We use Model 5 rather than Model 3 because it provides us with expected values conditional on information having been shared which is a better fit to the sequential nature of the simulation. We then calculate what proportion of threats that could have been neutralized by each team were actually neutralized by that team as a measure of team level performance. For system performance, we make the simplifying assumption that each successfully completed task on team level equally and positively contributes to the achievement of the system level goal. Based on this assumption, we compute system level performance as the total proportion of threats that were successfully neutralized. This assumption is a simplification of reality given that team level goals may have different levels of compatibility with the system level goal and with each other (Rico et al., 2017). At a basic level, however, the assumption that completing team goals contributes to goals at the higher level of the goal hierarchy is engrained in the definition of multiteam systems (Mathieu et al., 2001). In addition, while goal compatibility may vary in multiteam systems in the field, in our experiments, we held this factor constant. As our simulation is built on our

empirical data, we deem making this same assumption in the simulation reasonable.

Results

---------- Insert Figure 3 about here ----------

Figure 3 presents the results of the simulations as the average proportions of items having been shared and neutralized. The results can be interpreted as precise point estimates as standard errors converge to 0 with sufficient simulation runs. Several insights emerge from these analyses. First, we consider team-level outcomes (panels a and b in Figure 3). Panel a shows that the amount of information obtained by a system-focused team depends on the identity configuration of the system: A system-focused team surrounded by team-focused teams (3T:1S) obtains about 10% less information than does a system-focused team surrounded by other system-focused teams (0T:4S). In comparison, a team-focused team receives only 3 % less information when being the only team-focused team (1T:3S) compared to being surrounded exclusively by other team-focused teams (4T:0S). Panel b presents a similar picture with regard to team performance: With each shift toward system-focus in the system, a system-focused team succeeds in neutralizing an additional 4.3% of its threats – resulting in a 12.9% difference between the extreme scenarios - while the performance of a team-focused team is hardly affected by the system's identity configuration (2% difference between the extreme scenarios).

These results indicate that team-level information retrieval and performance are to a considerable extent more dependent on the system-level identity configuration for system-focused teams than they are for team-focused teams. That is, while a system-focused team can be more successful on interdependent tasks than a team-focused team, the composition of the rest of the system in terms of identity focus is a critical boundary condition for this positive effect. In a system that predominantly consists of team-focused teams, on the other hand, a system focus may even turn into a disadvantage. More formally:

Proposition 1: The effect of system focus on a focal team's performance on interdependent tasks is moderated by the identity configuration of the multiteam system it is embedded in.

Second, let us consider the system-level results (panels c and d in Figure 3). The simulation results suggest that the relationships between an increasing proportion of system-focused teams and system-level coordination (i.e., information sharing) and performance are convex rather than linear. This is easily explained by the fact that the proportion of asymmetric team-dyads in a system is higher, the closer a system's identity configuration is to 50:50. The specific shape of the function depends on the outcome in question. For information sharing our results suggest a U-shaped curve without a positive linear trend ($R^2_{\text{linear}} = 0.04$; $R^2_{\text{quadratic}} = 1.00$). That is, compared to a four-team multiteam system where all component teams primarily identify with their team, shifting the identity focus of one or of two teams to the multiteam system can be counterproductive for information sharing. Past the threshold of 50%, increasing the proportion of system-focused component teams is beneficial, however. For system-level performance, our results suggest a U-shaped curve with a positive linear trend ($R^2_{\text{linear}} = .70$; $R^2_{\text{quadratic}} = 1.00$). More specifically, while increasing the proportion of system-focused teams hardly affects multiteam system performance up to the threshold of 50%, beyond this threshold the proportion of system focus has an increasingly positive effect. Viewed from the opposite direction, it is the smallest deviation from a 100%-system-focus configuration that is associated with the largest drop in multiteam system performance. Based on this, we put forward a final proposition:

Proposition 2: There is a convex relationship between the proportion of system-focused teams in a multiteam system and system-level information sharing and performance.

DISCUSSION

Multiteam systems tackle many complex organizational tasks, in settings as varied as scientific innovation, new product development, health care, the military, and space exploration. In each of these settings, there is in an increasing realization that success hinges on both “intra”

and "inter" team processes. While sharing unique information is a challenge even within a team (Mesmer-Magnus & DeChurch, 2009), the "us-versus-them" social categorizations prevalent in "teams-of-teams" further compound the challenges of sharing unique information across teams. In the present work, we conducted three studies examining how the composition of multiteam systems in terms of component teams' primary foci of identification affects information sharing and performance. Our findings provide causal evidence for the role of social identity on these processes, and highlight the disruptive role of identity asymmetries – arising when component teams differ in what they consider to be their primary group.

Theoretical Implications

Multiteam system composition. Our study highlights the importance of considering both sides of the relationship when considering inter-team collaboration. With few exceptions (e.g., Bresman, 2013), the broader research on team boundary spanning or inter-team coordination and collaboration takes the perspective of one focal team and examines the influence of individual, team, or contextual factors on this team's interaction with external constituencies (e.g., de Vries et al., 2014; Joshi, Pandey, & Han, 2009; Marrone, 2010; Marrone, Tesluk, & Carson, 2007; Richter et al., 2006). Yet, such interaction is of a fundamentally dyadic nature – collaboration cannot happen if the other side does not cooperate. Thus, compositional factors of both teams as well as – as evident from our results – the interaction between these variables on seeker and on source side play an important role in shaping intergroup collaboration. This notion, while often absent in the broader boundary spanning and inter-team collaboration literature, is naturally embedded in the multiteam systems literature and, especially, in work on multiteam system composition (Lanaj et al., 2018; Luciano et al., 2018; Shuffler, Jiménez-Rodríguez, & Kramer, 2015). Luciano and colleagues (2015), for instance, discuss several compositional factors that induce differentiation between component teams such as goals, competencies, norms, work

processes, and information, suggesting that greater levels of differentiation will result in processes that undermine collaborative interactions between teams. We add two important nuances to this claim: First, within the same system some teams may perceive component teams as more differentiated than others. Second, such asymmetries have implications for inter-team information sharing and performance.

It is tempting to interpret our results in homophily terms: Teams share more information when their primary focus of identity coincides than when it does not. However, homophily would imply that the coordination breakdown would affect both teams in a dyad in a symmetric fashion: If it was a matter of homophily, we should see that system-focused teams would be less likely to share information with team-focused teams just as team-focused teams are less likely to share information with system-focused teams. Conversely, our first study shows a clear difference between the behavior of team-focused teams towards system-focused teams on the one hand, and the behavior of system-focused teams towards team-focused teams on the other.

In sum, this implies that the specific configuration of differences and similarities may be as important as the overall level of differentiation to multiteam system functioning. Just as research on team composition and processes increasingly adopts configural perspectives rather than main-effects approaches (Crawford & LePine, 2013; Humphrey & Aime, 2014; van Knippenberg & Mell, 2016), we can achieve a deeper understanding of multiteam system functioning by considering how different configurations of team attributes, processes, and emergent states result in different patterns of inter-team interaction and, consequently, influence system outcomes.

Social identity theory. Beyond the contribution to the multiteam systems literature, this work also feeds back to more fundamental social identity theory. In this paper, we break new ground by investigating the implications of identity asymmetries for dyadic effectiveness. When

it comes to the role of social identity in inter-team coordination and performance, the broad consensus in the literature seems to be that a strong identification with the overarching collective – the multiteam system or, in other contexts, the organization – is generally desirable (Cuijpers et al., 2016; de Vries et al., 2014; Dokko et al., 2014; Kane, 2010; Lomi et al., 2014; Richter et al., 2006 - but cf. Porck et al., 2019). While our findings support the main corollary of this proposition – that a system will be effective when all its component teams have a system focus - our proposition of a U-shaped relationship between the number of system-focused teams and system-level information sharing and performance challenges simplistic assumptions.

The key proposition of this paper is that identity asymmetries have an influence on intergroup collaboration. While our study focused on identity asymmetries between component teams within a multiteam system – and thus "intergroup" in our context translates into inter-team – arguably, similar arguments may be made at other levels of analysis. For instance, within a team, individuals have multiple foci of identity as they are simultaneously team members and representatives of demographic or professional social groups. Within-team differences in demographic or professional categories can be a strong foundation for the formation of subgroups – and thus we may have a situation in which intergroup relations must be managed within a team (Carton & Cummings, 2012). Importantly, research on team diversity and relational demography have demonstrated that such differences can also result in identity asymmetries within teams. For example, an individual's dissimilarity to other members of the team can have different effects on the extent to which they identify with the team or with the other social categories they belong to, depending on status asymmetries (Chattopadhyay, George, & Ng, 2011; Chattopadhyay et al., 2008; Chattopadhyay, Tluchowska, et al., 2004). As another example, an individual's perception of diversity in their team may have different effects on the

extent to which they will identify with their team, depending on whether they see a positive value in diversity (van Dick, van Knippenberg, Hägele, Guillaume, & Brodbeck, 2008; van Knippenberg, Haslam, & Platow, 2007). While these lines of research explain the existence of identity asymmetries also within teams, they do not typically address the consequences of such asymmetries for dyadic interaction - that is, they do not examine how the fact that two team members differ in their identification with their team influences their collaboration. Arguments we develop in the present work may contribute to future research on identity asymmetries across different levels of analysis.

In this study, we concentrated on the repercussions of differences in relative salience of the team and the system as a focus of identification of multiteam system members and we were largely agnostic to differences in team and system identification in absolute terms. While this binary distinction is suitable for a first investigation of identity asymmetries in multiteam systems, undoubtedly we may obtain a more differentiated understanding of identity asymmetries by also considering similarities and differences in absolute levels of team and system identification on seeker and on source side. In particular, prior research has highlighted additive as well as interactive effects of absolute proximate and overarching identification on groups' interaction with other groups (van Dick, van Knippenberg, Kerschreiter, et al., 2008) and put an emphasis on the role of dual identification – situations in which individuals have high absolute identification both with the component team and with the overarching system (Brewer & Brown, 1998; Cuijpers et al., 2016; Hornsey & Hogg, 2000; Pettigrew, 1998; Richter et al., 2006). It is important to note here that neither our conceptualization nor our operationalization of system focus imply that this is necessarily a situation of high absolute system identification and low absolute team identification (and vice versa for team focus). Rather, system focus means that

– at the margin – individuals perceive the system rather than the team boundary as the primary boundary. This can happen when system identification is high and team identification is low – but this can also happen when both system and team identification are high. Indeed, two pieces of meta-analytic evidence suggest that the latter is a more likely occurrence underlying a system focus than the former. First, the levels of identification with the proximate and with the overarching groups tend to be highly correlated (Mesmer-Magnus et al., 2018). Second, where divergence does exist, team identification is typically higher than system identification, for instance because the smaller size of the team relative to the system allows for more intense interaction and results in greater familiarity (Riketta & van Dick, 2005). Thus, while this study does not directly speak to the dual identity hypothesis, its findings are not at odds with it.

Implicit and explicit coordination. Our findings furthermore contribute to a better understanding of the interplay between explicit and implicit coordination in complex social systems. Theory on team coordination suggests that while teams typically use a mix of explicit and implicit forms of coordination (Espinosa et al., 2004), there is some substitutability between explicit and implicit coordination such that teams that can rely on implicit coordination to a greater extent engage in less explicit coordination (Rico & Sánchez-Manzanares, 2008). Equally, this implies that teams – or team dyads in our case – that cannot rely on implicit coordination to the same extent would compensate by increased explicit coordination. Yet, we did not find that teams who obtained less information from other teams in anticipation of their needs compensated by obtaining more information from those teams through making their needs explicitly known. An explanation for this may lie in the nature of information sharing as a coordination mechanism. For instance, work on transactive memory systems – i.e., team's shared cognitive systems for the division of cognitive labor (Hollingshead, 2001; Wegner, 1987) – suggests that

team processes around sharing and retrieving information from each other benefit from members having an understanding of who knows what (Mell, van Knippenberg, & van Ginkel, 2014; van Ginkel & van Knippenberg, 2009; Wegner, 1995). Expanding this argument to inter-team coordination within a multiteam system suggests that a seeking team that does not have an adequate representation of what information exists in the system and where it is located would be less likely to attempt to retrieve it from the right source. This, in turn, implies that – under such conditions at least – the responsibility for ensuring that information reaches the target in need of it primarily lies with the source rather than with the seeker. Proactive, anticipatory inter-team information sharing is key for multiteam system effectiveness.

Managerial Implications

In practice, this last insight finds exemplary application in policies developed by what we may call information professionals in recent years. Following the recognition that information barriers between different US government agencies contributed to the failure to prevent the attacks on the World Trade Center (*9/11 Report*, 2004), the US intelligence community revised its guidelines for inter-agency collaboration. Importantly, these guidelines include a shift from a "need to know" mindset emphasizing access restrictions to a "responsibility to provide" mindset emphasizing proactive information sharing within the community (*Intelligence Community Directive 501*, 2009). Adopting such guidelines, however, requires a cultural shift in which collective identity plays a key role. In the example of the intelligence community, information sharing guidelines went hand in hand with the establishment of superordinate entities charged with providing a focal point and supporting coordination within the community (Best Jr., 2011) – thereby increasing the salience of the superordinate community as a focus of identification. In other settings, such superordinate entities exist a priori – e.g., the new product development team housing multiple interdependent sub-teams (Hoegl & Weinkauf, 2004) – and the question is one

of managing identity in the multiteam system.

Our results have two implications with regard to this question. First, our finding that identity asymmetries can compromise inter-team information sharing and performance suggests that organizations should pay attention to organizational arrangements that may make such asymmetries particularly likely. These can be situations in which some teams are more central in the workflow than others, situations in which some teams are more physically or socially isolated from the rest of the system than others, or situations in which team leaders vary in their individual identity foci and consequent rhetoric. Second, while our results support the notion that interventions aimed at increasing members' identification with the system can improve system functioning, they highlight that managing such a transition is not straightforward. Our finding that team-focused source teams withhold information from system-focused seeking teams suggests that even having just one team-focused team on board may go disproportionately far in spoiling the proverbial barrel. Thus, an intervention aimed at shifting the primary identity focus of only a part of the system holds limited value. Furthermore, even if the intervention is aimed at the entire system but – perhaps for practical reasons - is staggered such that some component teams receive it later than others, the transition phase itself may be a source of vulnerability to the system as it results in temporary asymmetries, introducing the associated coordination breakdowns. In sum, our study suggests that, in order to be successful, interventions aimed at shifting a system from team focus to system focus must be all-encompassing and simultaneous.

Boundary Conditions

Our theory and results are subject to multiple boundary conditions. First, implicit in our theory is the assumption that teams are reciprocally dependent on each other – in each dyad, both teams are simultaneously seekers and sources and depend on each other's information to roughly the same extent. It is under these conditions that the instrumentality motive results in more

reciprocity-oriented information sharing. If, on the other hand, dependence is asymmetric between teams – the extreme case being one team depending on another team which does not depend on the former – we may observe different patterns of interaction. The exact pattern would depend not only on the composition of the system in terms of identity foci and information distribution but also on the specific configuration and alignment of the two aspects.

Second, we created a situation in which each component team's main goal – eliminating threats - is equally instrumental to the system goal: It does not matter in which district a possible attack would happen; for a successful outcome, the entire region needs to be kept safe. While, at a basic level, a positive functional relationship between the achievement of team goals and the achievement of system goals is a defining element of a multiteam system (Mathieu et al., 2001), in practice, some teams' goals may be more clearly aligned with the system goal than other teams' goals (Rico et al., 2017). Arguably, stronger differentiation among teams in terms of goal compatibility could further exacerbate the differences in information sharing behavior, depending on how goal compatibility and identity foci are aligned with each other.

Finally, as we note above, the importance of proactive information sharing relative to reactive information sharing depends on the nature and structure of the task and with this on the ability of multiteam system members to engage in proactive and reactive information sharing effectively. In this study, members lack knowledge of who has what information – limiting their ability to effectively request what they need. Conversely, on tasks structured such that members can more easily develop an understanding of who knows what – for instance in the presence of clear expert roles – members have been shown to engage in more information retrieval, triggering more reactive information sharing (Mell et al., 2014). At the same time, in the present study, members have the knowledge of who needs what information – increasing their ability to

share what they know. If the task were structured such that members were less able to anticipate who will need what information in order to perform their part, proactive information sharing may not only be less prevalent, but also less effective: Pushing information to recipients for whom it is irrelevant would increase counterproductive information overload (Ellwart, Happ, Gurtner, & Rack, 2015). In sum, effective information sharing depends on both motivation and ability to seek and to share information (Reinholt, Pedersen, & Foss, 2011). While the focus of our study lies on motivational antecedents, teams' ability to seek and to share – in particular such ability as arises from features of the task – is an important boundary condition.

Limitations

As discussed in the preceding section, the absence of knowledge of who knows what in our setting may have made it more difficult for participants to engage in requesting information from other teams, resulting in a relatively low base rate and low variability of reactive information sharing. While this setup is not unrealistic – in many situations, information seekers do not know who has the information that they need – we cannot exclude the possibility that the low variability may have limited our statistical power to detect differences in reactive information sharing between our conditions. Thus, our test of Hypothesis 1b may have been underpowered.

In the present study, we examined the interplay between proactive and reactive information sharing in aggregate form. While this allowed us to identify the effect of the identity manipulations on the total of a team's information sharing activity, examining the temporal pattern of this interplay is an intriguing avenue for future research. For example, new methods capable of capturing the complexity of group interaction over time could allow to examine hypotheses about temporal sequences of proactive and reactive information sharing (Leenders, Contractor, & DeChurch, 2016; Schecter, Pilny, Leung, Poole, & Contractor, 2018).

Although the laboratory setting of our main study presents several advantages, it also poses

limitations. There is certainly a difference in the intensity of the identification that can be created in the lab as compared with what exists in the field where teams collaborate over long time spans and team interactions are settled in the context of power and status differences, long standing relationships, and organizational politics. These factors, along with many others, can shape social identities as well as inter-team collaboration patterns independent of or in interaction with identity concerns. Insofar as our study abstracts from this context, it is naturally a simplification of reality. On one hand, this ability to isolate a focal construct and investigate its implications while holding constant potential confounding factors is a core strength of the experimental method. At the same time, future research examining the role of these factors as antecedents or potential moderators of the effect of identity asymmetries would be highly valuable.

A further limitation of our study inherent in the laboratory setting is the relatively short duration of the task interaction. It is plausible that over the course of prolonged interaction component teams' identity foci may shift as a result of initial asymmetries and consequent interaction patterns. The dynamic nature of identity asymmetries and their consequences remains a subject for future research.

Finally, as with any experimental study, there is the question to what extent its findings are generalizable to the field. As several decades of work on social identity have shown, identification can be meaningfully manipulated in the lab (Hornsey, 2008). As a recent meta-analysis furthermore shows, the effects of social identity found in the lab generally parallel those found in the field (Mesmer-Magnus et al., 2018). Thus, although there are clear limitations to the lab as a setting, given the evidence provided by this stream of research as a whole, we have little reason to believe that the relationships we find are unique to this setting.

Conclusion

Managing inter-team collaboration is a critical task in multiteam systems and other

complex organizational arrangements. Social identity plays a key role in this process. The present study not only contributes causal evidence for this claim, but also further extends our understanding of the role of social identity in multiteam systems by shedding first light on the implications of differences in identity foci between interdependent teams for collaboration and performance.

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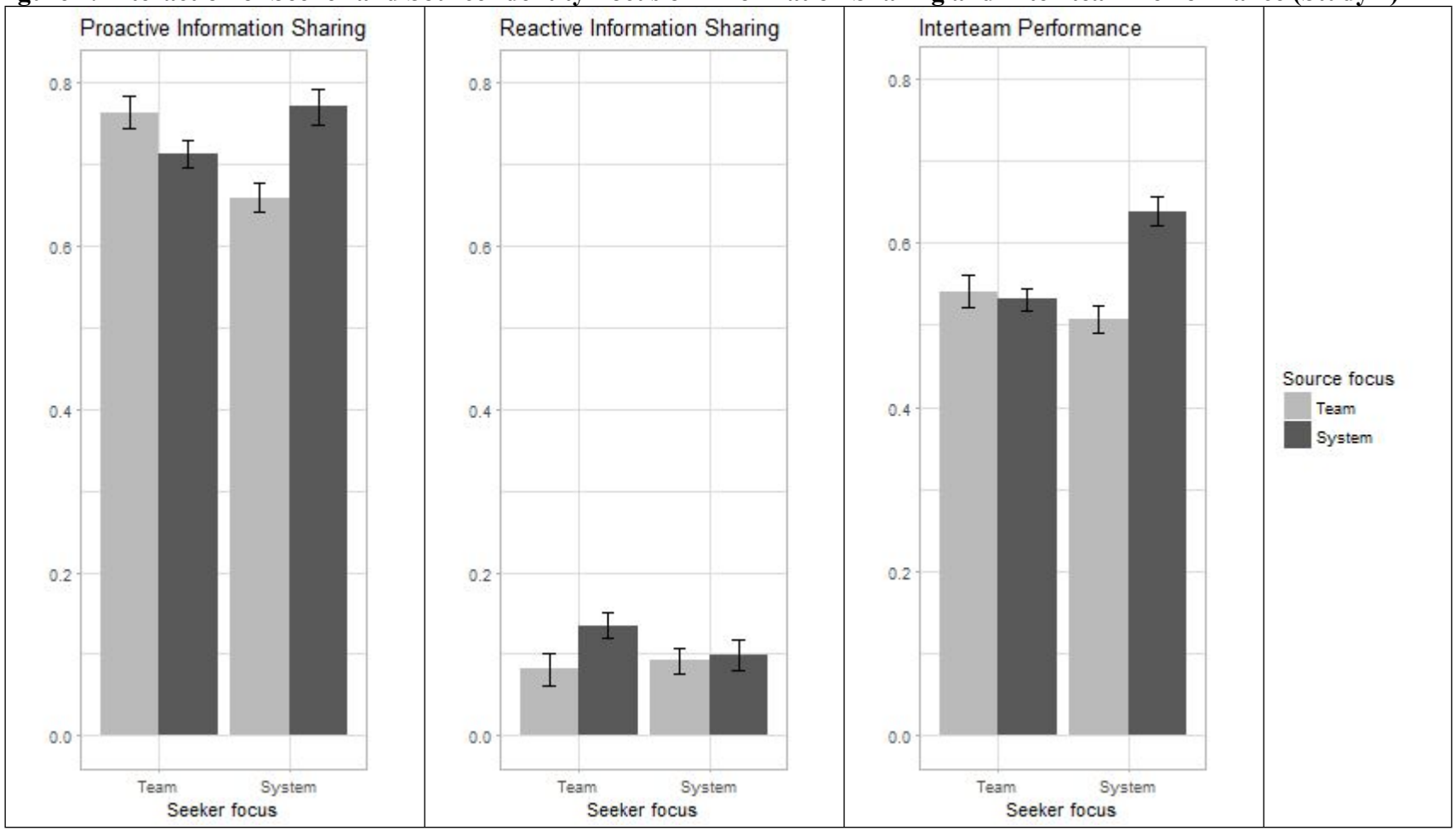
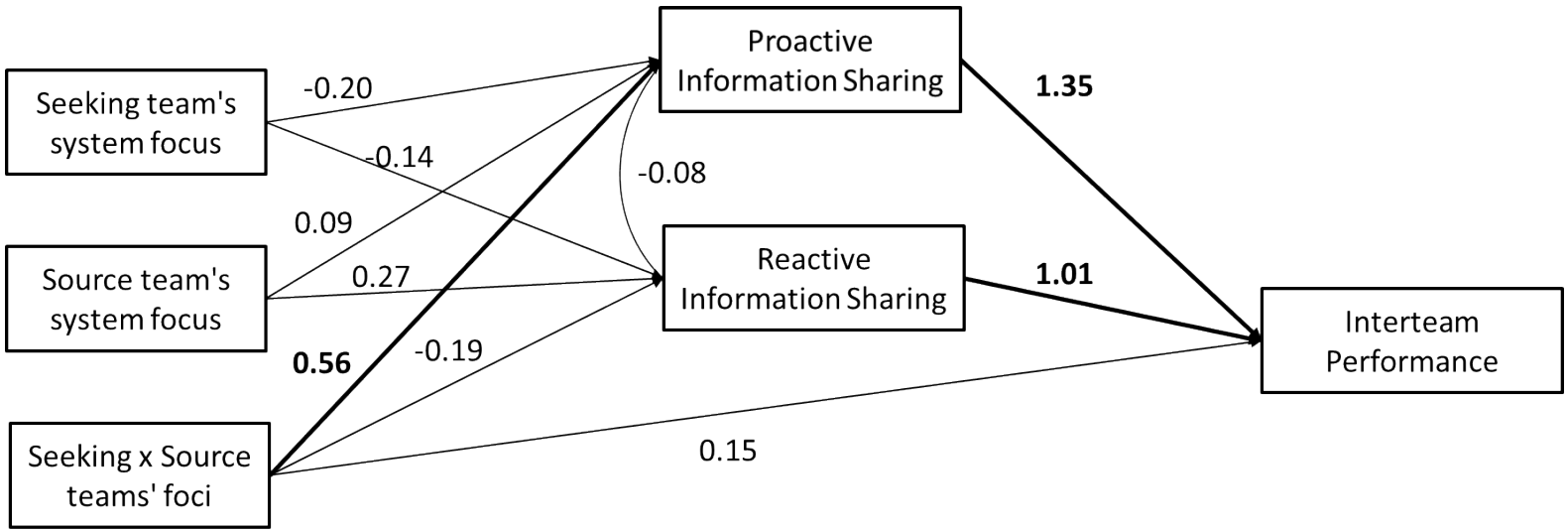
Figure 1. Interaction of Seeker and Source Identity Focus on Information Sharing and Inter-team Performance (Study 1)



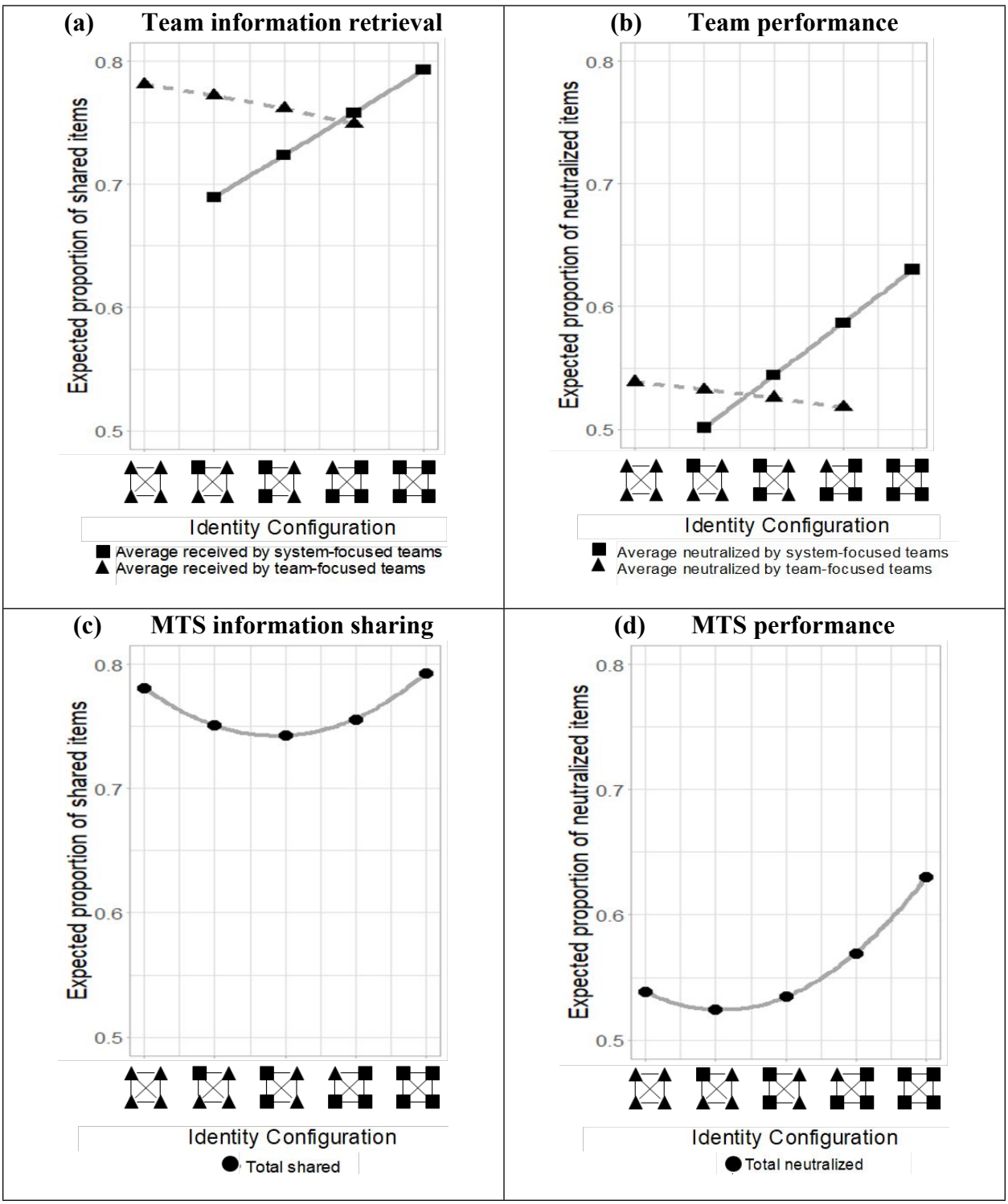
Note. Bars represent predicted values based on the estimated models (Models 1, 2, and 3 in Table 2, respectively). Lines represent 95% confidence intervals of the predicted values.

Figure 2. Path Model Results (Study 1)



Note. Bold paths and coefficients indicate that the 95% Bayesian Credibility Interval around the parameter did not contain zero.

Figure 3. Expected Effects of Different Multiteam System Identity Configurations on Multiteam System Information Sharing and Performance (Study 3)



Note. Squares represent system-focused teams, triangles represent team-focused teams. MTS = multiteam system.

Table 1. Descriptive Statistics (Study 1)

Variable	Source focus: Team		Source focus: System		Correlations	
	Seeker focus: Team	Seeker focus: System	Seeker focus: Team	Seeker focus: System	2.	3.
1. Proactive information sharing	0.75 [3.4]	0.66 [2.8]	0.70 [3.5]	0.77 [3.9]		
2. Reactive information sharing	0.09 [0.4]	0.10 [0.4]	0.14 [0.7]	0.11 [0.5]	-0.08	
3. Inter-team performance	0.54 [2.4]	0.51 [2.2]	0.53 [2.7]	0.63 [3.2]	0.41**	0.18**

Notes. Values indicate the proportion of shared or neutralized threats in each seeker-source condition. Values in square brackets indicate average number of items shared or neutralized in each seeker-source condition. $N = 1176$ threats in 252 dyads. Correlations were calculated on the level of the dyad, that is setting in relation the proportion of shared or neutralized threats in each dyad.

**$p < 0.01$, two-tailed

Table 2. Results of Generalized Linear Mixed Models (Study 1)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	Proactive information sharing	Reactive information sharing	Inter-team performance	Inter-team performance	Inter-team performance (Shared items only)
Random effects	Variance	Variance	Variance	Variance	Variance
Seeker	0	0.69	0.09	0.26	0.30
Source	0.33	0.14	0.11	0.05	0.06
Multiteam system	0.04	0.31	0.06	0.03	0.02
Fixed effects					
Intercept	0.69 (0.09)**	-1.91 (0.22)	0.14 (0.08)	-1.95 (0.16)**	0.72 (0.09)
Seeker focus	-0.06 (0.09)	-0.15 (0.25)	0.10 (0.10)	0.24 (0.15)	0.28 (0.16)$^{+}$
Source focus	0.12 (0.16)	0.28 (0.17)$^{+}$	0.18 (0.11)	0.11 (0.11)	0.13 (0.12)
Seeker focus X Source focus	0.53 (0.18)**	-0.28 (0.27)	0.38 (0.16)*	0.24 (0.20)	0.30 (0.21)
Proactive information sharing				2.52 (0.16)**	
Reactive information sharing				1.80 (0.20)**	
Log-likelihood	-658.00	-345.15	-777.69	-543.90	-503.8
N	1176	1176	1176	1176	893

Notes. Conditions are contrast-coded: -0.5 = team focus, +0.5 = system focus. Standard errors in parentheses.

$^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$. Tests are one-tailed for tests of directional hypotheses (effects of proactive and reactive information sharing), and two-tailed for all other coefficients.

Table 3. Results of Mediation Analysis (Study 2)

	Instrumentality motive				Reciprocity-oriented information sharing				Reciprocity-oriented information sharing			
Regression models	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*	*B*	*SE*	*t*	*p*
Intercept	3.40	0.06	55.94	<0.01	58.27	1.76	33.06	<0.01	42.95	6.34	6.77	<0.01
System identity focus	-0.55	0.08	-6.53	<0.01	-4.73	2.45	-1.93	0.03	-2.25	2.61	-0.86	0.39
Instrumentality motive									4.50	1.79	2.51	0.01
R^2	0.38				0.01				0.04			
Indirect effect									*effect*	*SE*	*LCI*	*UCI*
Identity focus via instrumentality motive									-2.48	1.05	-4.63	-0.58

Note. All t-tests are one-tailed. LCI and HCI = lower and higher bounds of 95% bootstrapped confidence interval.

BIOGRAPHICAL SKETCHES

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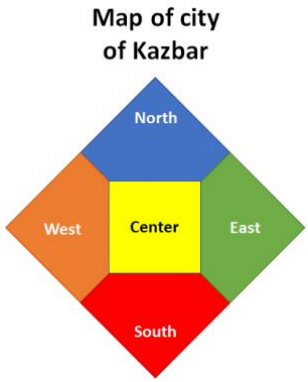
SUPPLEMENT TO "IDENTITY ASYMMETRIES: AN EXPERIMENTAL INVESTIGATION OF SOCIAL IDENTITY AND INFORMATION EXCHANGE IN MULTITEAM SYSTEMS": MATERIALS FOR STUDY 2

1. Introduction to scenario

Please imagine the following situation:

You are working as an intelligence officer in Taskforce Delta. Delta's main mission is to ensure the security of Kazbar, a city in a conflict region that regularly faces terrorist threats. This is a map of Kazbar:



Because Kazbar is a fairly large city, your taskforce consists of five teams: Team Center, Team North, Team East, Team South, and Team West.

Each team has intelligence officers and field specialists. Intelligence officers gather information about potential threats from different sources. Field specialists use this information to neutralize these threats. Each team is primarily active in their own district, but together your objective is to secure the city of Kazbar.

As an intelligence officer, you regularly talk to your sources. Sometimes you learn information about threats in your distict and sometimes you lean information about threats in other districts. Similarly, intelligence officers in other districts sometimes learn information about threats in your district from their sources.

When you learn useful information from your sources, you write this information in a memo and send it to the field specialist for whom it will be relevant. Because there is never enough time, you often need to prioritize and choose between sending different memos to different taskforce members.

2. Identity focus manipulation.

[team focus]

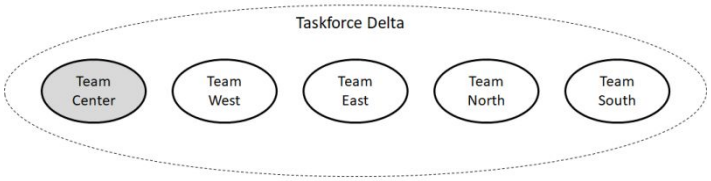
You are part of Team Center. While both, your membership in in Team Center and your membership in Taskforce Delta are important to you, when you think of yourself you usually see yourself as a member of the team first – and member of the taskforce second.

You have shared many experiences with the other members of the team and as a result you feel a strong sense of attachment and unity with the team. You often compare your team to other teams operating in the other districts and you are proud of what you have achieved

together with your team so far. You view the cooperation with the other members of your team as something particularly special.

All in all, even though you feel connected to both, your team and the overarching taskforce, you feel particularly at home in your team. When you think about your team, you think "we". When you think about the other teams, you think "they".

Structure of Taskforce Delta



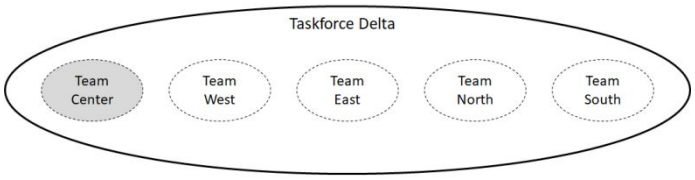
[system focus]

You are part of Team Center. While both, your membership in in Team Center and your membership in Taskforce Delta are important to you, when you think of yourself you usually see yourself as a member of the taskforce first – and member of the team second.

You have shared many experiences with the other members of the taskforce and as a result you feel a strong sense of attachment and unity with the taskforce. You often compare your taskforce to other taskforces operating in other cities and you are proud of what you have achieved together as a taskforce so far. You view the cooperation with the other members of your taskforce as something particularly special.

All in all, even though you feel connected to both, your team and the overarching taskforce, you feel particularly at home in your taskforce. When you think about the other teams in the taskforce, you always think "we" - just the same as when you think about your own team - never "they".

Structure of Taskforce Delta



3. Information scenario

When you talked with your sources today, you have learned about two potential threats: one in the North and one in the South district.
Apart from the information about the threats, your sources had some additional insights for you.

They mentioned that Team North has just established a connection to a new source with ties to the Center District. This means that Team North is likely to learn a lot of information about the Center District in the foreseeable future.

They also mentioned that one of Team South's key sources of information about the Center District has just gone underground. This means that Team South is not likely to learn any information about the Center District in the foreseeable future.

4. Reciprocity-based information sharing: Time allocation

Because time is limited, you have to split your time between writing memos. The more time you spend on a memo, the more useful it will be for the field specialist who receives it.

How will you split your time? You can give between 0 and 100 percent of your time to any of these two memos, but it has to add up to 100.

5. Instrumentality motive

How would you generally think about your team's relationship with the other teams on the task force?

1. I would think more about what other teams can do for my team than what I can do for them.
2. I would tend to contact other teams only when I need something from them.
3. The main reason why relationships with other teams would be important to me is because they help me accomplish my team's goals.
4. My relationship with another team would be based on how productive it is, rather than on how much I enjoy it.
5. If the nature of my team's task changed and another team wasn't helpful anymore, the relationship probably wouldn't continue.
6. I would like a team that is not useful to my team less than I would like a team that is useful to my team.