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The Development of Group Identity in Computer and Face-to-Face Groups with Membership Change

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Abstract. A three-part conception of group identity is proposed that draws on common fate, cohesiveness, and cognitive views of group identity. The changing contribution of these three components to group identity was examined for 31 original and 29 reconfigured groups which met for 7 consecutive weeks using either face-to-face (FTF) or computer-mediated communication (CMC). Group identity was consistently lower for computer-mediated groups, and this effect was stronger in the reconfigured groups. In the original groups, group identity started high and declined for both FTF and CMC groups. In the reconfigured groups, developmental patterns differed from those of the original groups, and also differed by communication medium. Individual differences accounted for a substantial amount of variance in group identity across original and reconfigured groups.

Key words: Group identity, computer-mediated communication, group development, membership change

1. Introduction

Members of groups often encounter tensions between maximizing individual interests or working for the good of the team as a whole. This is especially true in organizations that have adopted work groups as a basic organizational work unit yet maintain incentives and reward systems that are geared toward the individual. Strong identification with the group, or group identity, has been shown to promote cooperative behavior among members of small groups that face such tensions (Chen, 1995; Dawes, McTavish, and Shaklee, 1977; Kramer and Brewer, 1984). Designing work teams to facilitate the emergence of group identity should thus promote cooperation among members.

Although organizations often rely on work groups as the unit of production, work groups no longer need to meet face to face on a regular basis to complete their work. The increasing use of communication systems such as electronic mail (e-mail) permits group members to stay in close touch without direct face-to-face interaction. With the advent of e-mail, fax machines, and phone and video-conferencing, group members can continue to fulfill their organizational commitments while dispersed among several offices, or while members are working at home or traveling. At the extreme, members of "virtual" work groups may communicate and work together

on projects but never actually meet as a group in the same room or even the same city (Armstrong and Cole, in press).

Members of dispersed groups that rely on computer-mediated communication (CMC) continue to be interdependent as they work on a common task, but they do not enjoy the richness of interpersonal contact that face-to-face communication (FTF) affords (Daft and Lengel, 1986). In FTF communication, group members have access to nonverbal and paralinguistic cues, making the information communicated in that context much richer. In contrast, computer-mediated communication (CMC) strips nonverbal and paraverbal cues from the context, making information communicated much leaner. Missing cues make getting to know one another in an personal way (beyond just information that is communicated) more difficult, or at least makes the process a lengthier one. The "leanness" of interaction using CMC may inhibit the development of ties to the group and its members (see McGrath and Hollingshead, 1994, for a review). This barrier to strong group identity may diminish over time, however, for groups that meet for multiple sessions (Chidambaram, Bostrom, and Wynne, 1991).

2. Stability and change in group membership

Most of the scanty research on the effects of communication media over time has focused on groups whose membership and operating conditions remain stable throughout the study (for exceptions, see DeSanctis, Poole, Lewis, and Desharnais, 1991; McGrath, 1993). In the rapidly changing environment that typifies many modern organizations, however, work groups do not necessarily endure intact, no matter how strongly identified members become with their team. Individual members may be temporarily or permanently reassigned to different groups. Organizational circumstances may dictate that existing groups be dissolved altogether and their members reconfigured into new groups. These new groups may also rely on a different "mix" of face-to-face and remote communication to coordinate their joint work. These new possibilities raise a number of questions about the development, and redevelopment, of employees' allegiance to their groups. When people move from one group to another, how quickly do they "let go" of their identification with their former group and transfer their allegiance to the new group? Is strong identification with a former group a source of resistance to developing new loyalties? Or does high group identity in one group indicate the presence of strong social skills that will transfer to subsequent groups? Does the primary communication technology used by the group affect the occurrence or strength of either interference or transfer effects? Do temporary reassignments have a different impact than permanent transfers? The purpose of this paper is to explore these questions using a data set from a longitudinal study.

3. The longitudinal study

The longitudinal study described in McGrath and Arrow (1996 [this issue]) provides an opportunity to examine the development of group identity for both FTF and CMC groups. Thirty-one 3- or 4-person groups met for 7 weeks using either a FTF or CMC medium exclusively. Then all members were reassigned to 29 new groups and switched to the other communication medium. They spent the remaining 7 weeks of the course in these new groups. The reconfiguration of groups at the midpoint allows us to investigate the effects of previous identifications on the formation of new allegiances.

In Week 5 of the original groups, one member from each group was switched into another group using the same communication medium, round-robin fashion. Thus each group lost a regular member and gained a guest. Group members decided among themselves which of them would travel to another group, with the experimenter choosing a member at random in the few cases where groups were unable to reach a decision. The following week, all traveling members were transferred back to their regular groups. No member switch manipulation was performed in the reconfigured groups.

In this paper, we test a series of predictions for how group identity will develop over time for both FTF and CMC groups, whether it will differ in the reconfigured groups, and how the temporary reassignment of members will affect group identity both at the individual and group level.

Before we present our hypotheses, however, we need to clarify what we mean by group identity. We propose a tripartite conception of group identity that integrates components stressed in different bodies of research.

4. A tripartite view of group identity

Group identity is used to explain cooperation in the social dilemma literature (Brewer and Kramer, 1986; Dawes et al., 1977; Kramer and Brewer, 1984; Chen, 1995) and intergroup conflict in the group processes literature (Tajfel and Turner, 1979). It is treated as a variant of social identity (Hogg, 1992; Lau, 1989), and as a consequence of cohesiveness among members (Hogg and Abrams, 1988). What precisely is meant by group identity, however, is often implied rather than clearly stated, and definitions, when given, vary widely. Existing perspectives on group identity can be grouped in three general categories: (1) those that emphasize interdependence, common fate, and collective interests (a *behavioral* or *experiential* component); (2) those that emphasize cohesiveness and the development of interpersonal bonds among group members (an *affective* component); and (3) those that emphasize awareness of the group and identification of oneself as a group member (a *cognitive* component).

Drawing on these common threads, we conceptualize group identity as *awareness of and attraction toward an interacting group of interdependent members, by*

self-identified members of that group. Members of groups with strong group identity will readily identify themselves as members, will feel positively about their group, will enjoy interacting as a member of the group, and will exhibit in-group bias. Collective group identity of a group is the sum of member identification with and attraction toward the group.

The affect and cognitions of each group member contribute toward collective group identity. In contrast to social identity (Tajfel and Turner, 1979) and social categorization theory (Turner, Hogg, Oakes, Reicher, and Wetherell, 1987), however, we do not conceptualize group identity as primarily an individual social cognition. Instead we view it as a construct that includes individual, interpersonal, and group aspects and that integrates cognitive, affective, and behavioral components. How important the different components are in shaping the development of group identity may vary depending on the context and operating conditions of the group, including the communication medium used by the group members.

5. Development of group identity over time

5.1. Common fate: The experiential component

The common fate view focuses on the interdependent outcomes of group members (Chen, 1995) as the key component in group identity. When members are interdependent, cooperative behavior by individual members improves the outcome for the group as a whole. This shared outcome has been labelled "common fate" (Brewer and Kramer, 1986; Kramer and Brewer, 1984). The emphasis is on the interdependent consequences of member behavior, and on shared experiences. Members identify with the group because they recognize their common fate.

Group identity should be high when group members share common outcomes and experiences and low if they either share no common outcomes or fail to recognize their interdependence. The strength of group identity may well depend on the importance of the outcomes that the group shares. Unless the importance of these common outcomes changes over time, this view implies no developmental changes in group identity once group members recognize this interdependence. The group's main communication medium should make no difference in group identity levels unless it changes the importance of the group's common outcomes (or affects members' awareness of their interdependence). Figure 1 (left half) illustrates the proposed static pattern of group identity for the groups in the longitudinal study described above. It presumes a constant level of group interaction and common outcomes in each week, and shows minimal fluctuations for groups in both communication media.

Static Common Fate Hypothesis (1): Group identity will not differ between media, across time, or between original and reconfigured groups.

Focusing only on interdependence yields this rather simplistic version of the common fate perspective. A second, more dynamic, version of the common fate perspective is also possible. If group members consider not only their common

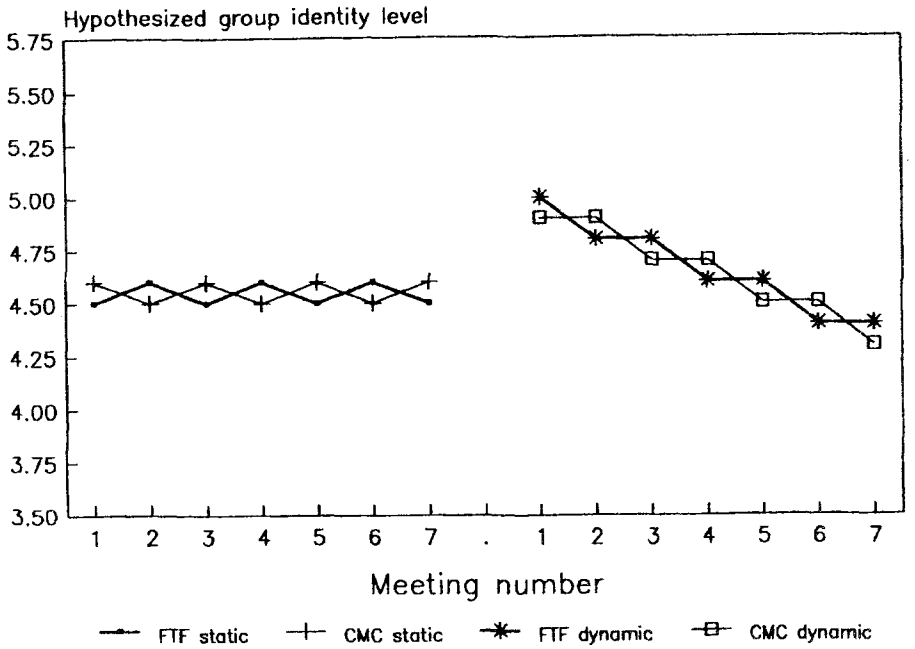

Figure 1. Expected patterns for static (left) or dynamic (right) common fate predictions.

outcomes in the here and now, but also the outcomes they will share in the future, group identity may well change over time for groups that expect to stay together for a fixed period of time. The dynamic view of common fate includes the *shadow of the future* (Axelrod, 1984). Members of task forces that will disband when they complete a given project (Argote and McGrath, 1993; Arrow and McGrath, 1994) know they will part company in the foreseeable future. The shadow of the future covers all expected future interaction and shared outcomes. As time passes and the group's endpoint approaches, the shadow shrinks.

If common fate is considered in this broader context – how long will I be interdependent with these people – then the common fate view implies a change in the level of group identity over time. Specifically, group identity should start out high, and then decrease steadily until the group dissolves. The level and slope of group identity should depend on how long the group expects to remain together – the length of the shadow of the future. No differences are expected for different communication media. Figure 1 (right half) illustrates the expected dynamic pattern for the groups in the longitudinal study reported here.

Dynamic Common Fate Hypothesis (2): Group identity will decrease over time in both FTF and CMC groups. The pattern of change will not differ between original and reconfigured groups.

5.2. Cohesiveness: The Affective, Interpersonal Component

An affective view of group identity was developed by Kerr and Kaufman-Gilliland (1994) in their study of group identity as a factor in cooperation. They reason that group identity develops as affective bonds develop among members (Kerr and Kaufman-Gilliland, 1994). Others (Hinkle, Taylor, Fox-Cardamone, and Crook, 1989) have developed a group identity scale that emphasizes the importance of interpersonal ties and attraction in group identification, with items such as "I feel strong ties to this group" and "I feel uneasy with members of this group" (reverse scored). Kerr and Kaufman-Gilliland reason that once this affective relationship develops, group members' concern for the group outcome will be greater than their concern for their own (individual) outcomes.

This component of group identity is very similar to the long-studied concept of cohesiveness, which has been defined as the forces that bind members to each other and to their group (Seashore, 1954) and as the sum total of all forces attracting members to a group (Cartwright, 1968), including interpersonal attraction, attraction to the group task, and attraction to the status conferred by the group. In practice, as McGrath points out (1984), cohesiveness researchers have emphasized interpersonal attraction and neglected the other aspects. However, overemphasis on interpersonal attraction to the neglect of other aspects of cohesion is regarded by some researchers as inappropriately narrow (e.g., Hogg and Abrams, 1988; Hogg, 1992; Zaccaro and Lowe, 1988).

The affective or cohesiveness view of group identity implies predictions for changes in the strength of group identity over time. Numerous theories of group development posit that group cohesiveness develops in the later stages of group life. Tuckman's stages theory (1965; Tuckman and Jensen, 1977), for example, explicitly identifies the third, norming stage with the development of group cohesion. Empirical data (Maples, 1988) and other stage theories (Hill and Gruner, 1973) have reaffirmed cohesion as characteristic of later, rather than early, stages in a group's history. This seems logical, as strong interpersonal bonds take time to develop.

Dynamic Affective Hypothesis (3): Group identity will start low, increase over time, and then stay high for CMC and FTF groups.

The lack of rich interpersonal cues in CMC groups (Daft and Lengel, 1986) suggests that the affective component of group identity will develop more slowly in these groups than in FTF groups. Single-session studies frequently find lower interpersonal attraction in CMC than FTF groups (Kiesler, Zubrow, Moses, and Geller, 1985; Straus and McGrath, 1994). However, CMC groups may overcome this barrier over time. Longitudinal studies have found that cohesiveness (Chidambaram et al., 1991) and trust among members (Walther and Burgoon, 1992) increased over time for CMC groups that met repeatedly, in some cases exceeding the level in FTF groups (Anson, 1990, cited in Mennecke, Hoffer, and Wynne, 1992; Chidambaram et al., 1991). Thus, differences in group identity between

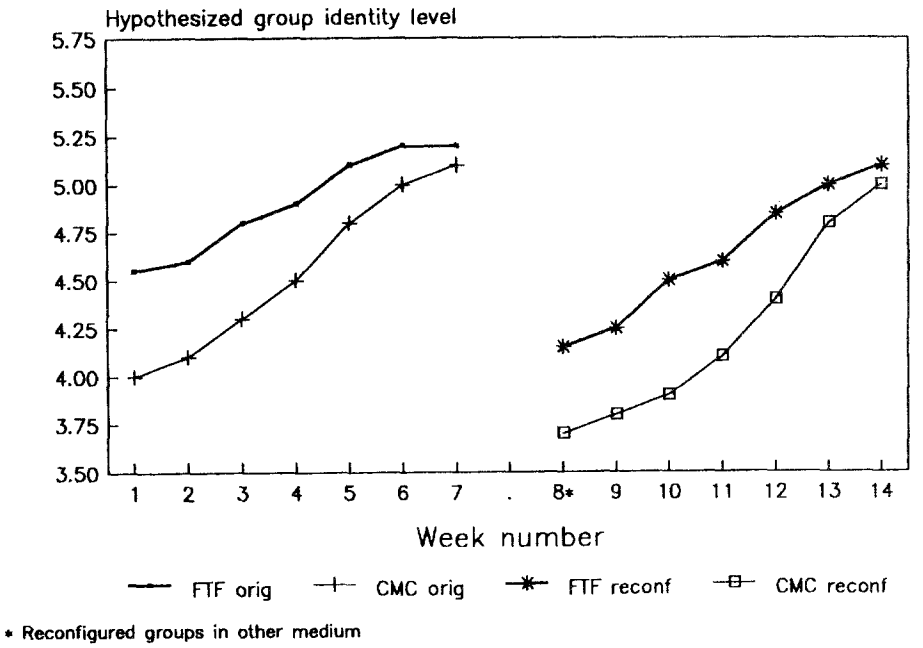

Figure 2. Expected patterns based on affective, medium, and social history predictions.

CMC and FTF groups are likely to fade over time, as the CMC groups "catch up" to the FTF groups in their affective development. Figure 2 illustrates the expected pattern.

Affect and Medium Hypothesis (4): Group identity will be higher in FTF than in CMC groups early in a group's tenure, but the difference will decrease over time.

As is evident from Figure 2, we do not expect the affective component to lead to identical patterns for original and reconfigured groups. The final stage of group development involves a gradual emotional disengagement (Tuckman and Jensen, 1977) that includes both sadness at separation and joy (in successful groups) in what the group has accomplished (McMurrain and Gazda, 1974). When a group is abruptly terminated by outside forces such as managers intent on reengineering or experimenters with their own agenda, we expect former members to engage in a "reminiscence" period (Moreland and Levine, 1988) that will temporarily interfere with the development of new affective bonds. This can be considered a social history effect on the development of group identity.

Social History Affective Hypothesis (5): Group identity will be lower in early weeks for the reconfigured groups than it was for early weeks of the original groups.

5.3. Social Identity: The Cognitive Component

Lau (1989) defines group identity as the collective awareness of the group as a distinct social entity, which is clearly a cognitive view of group identity. The notion of group belongingness (Hogg and Abrams, 1988) is also related to the cognitive component of group identity. The most well-developed expression of the cognitive view, however, is found in social identity and social categorization theory.

Group identity is easily confused with social identity. Social identity theory argues that people identify with broad social categories (Hogg and Abrams, 1988) such as race, sex, or religion, to which they belong. Individuals categorize themselves as belonging to multiple groups, and these memberships are included in that individual's self-definition (Brewer, 1991). Social identity thus includes all of the social roles and categories that together form a person's collective self – mother, sister, psychologist, teacher, lesbian, etc. (Deaux, Reid, Mizrahi, and Ethier, 1995). The individual's identity (who they believe they are) depends on these memberships and evaluations. To promote positive self-esteem, individuals are motivated to evaluate groups they belong to positively. This also leads to positive evaluation of other individuals who share membership in those groups (Hogg and Abrams, 1988).

A number of researchers use the term group identity interchangeably with social identity (e.g., Miller, Gurin, Gurin, and Malanchuk, 1981; Conover and Feldman, 1984). We do not. Instead, we conceptualize the cognitive component of group identity as the identification of all group members with a *specific* interacting group. Social identity is a set of cognitions within an individual about an array of groups or social categories. Group identity refers to cognitions about a single group without reference to the existence of other groups. Social identity refers to individual cognitions about one's membership in broad social categories without reference to specific interacting groups.

For each member of the group, however, identification with a specific interacting group can either overlap or cross-cut other salient aspects of their collective self (Brewer, in press). For members of a racially homogeneous group, group identity will overlap the racial component of their social identity. In a racially diverse group, however, group identity will cross-cut each member's social identity, so that the group may be viewed not as a single group but as two or more subgroups (depending on the number of races represented). Groups that are homogeneous in race and gender should thus have higher group identity than groups that are more heterogeneous. Race and gender should be less salient in CMC than they are in FTF groups, where such characteristics can be directly observed. Thus we expect little or no effect of demographic diversity in CMC groups.

Demographic Diversity and Medium Hypothesis (6):

> *Demographically diverse FTF groups will have lower group identity than homogeneous groups. There will be little difference in CMC groups.*

The effects of medium on the cognitive component of group identity go beyond just considerations of demographic diversity. Work conducted by Russell Spears and his colleagues (Spears, Lea, and Lee, 1990) has considered the impact of medium on social identity in general (the cognitive component of group identity). Consistent with our previous descriptions, Spears considers the CMC environment to be more depersonalized than the FTF environment. This depersonalization can serve to enhance group identity initially because the group as an entity is more salient than the differentiated individuals when the group begins meeting. As time passes and the members get to know each other via the CMC medium the depersonalization becomes less noticeable. It follows that the individuals will become more differentiated as the environment becomes more "personal" and members get to know each other as distinct individuals. This analysis leads to the prediction that group identity will be higher for CMC groups than FTF groups at the beginning of the groups' histories, with the difference fading over time. Group identity should decline for groups in both media over time.

Depersonalization and Medium Hypothesis (7): CMC groups will have higher group identity in the early weeks than FTF groups, but this difference will fade over time. Group identity in both types of groups will decline over time.

Social identity should also influence how group members respond to being reconfigured into new groups. Evidence from experimental studies that relied on short-lived, arbitrary categorizations such as "overestimators" and "underestimators" rather than demographic categories (Gaertner, Mann, Murrell, and Dovidio, 1989; Marcus-Newhall, Miller, Holtz, and Brewer, 1993) suggests that cross-cutting identification of members with their original groups may also impede the development of interpersonal attraction in reconfigured groups. The interference in this case is not affective, but cognitive. Over time, however, identification with the original group will become less salient, and group identity in the reconfigured groups will increase. This leads to the same prediction made for the social history hypothesis.

Cognitive Interference Hypothesis (8): Group identity will be lower in early weeks for the reconfigured groups than it was for early weeks of the original groups. (Same as Hypothesis 5.)

6. Individual differences in group identification

So far, we have focused on group identity as a collective construct, without reference to group composition effects. However, collective group identity is composed of the cognitions, evaluations, and interdependent interactions of individual members. Members may differ on characteristics that affect these components. Some individuals may have a stronger tendency to identify with members of an interacting group to which they belong. Individual differences in this tendency can be assessed by comparing the level of group identity for the same individual across groups. Members who contribute relatively more to collective group identity in

their original group should show a similarly high contribution in the new group to which they are assigned after the reconfiguration.

Individual Differences Hypothesis (9): Group identity in original and reconfigured groups will be positively associated at the individual level.

7. Group identity and membership change

The reconfiguration of groups allow us to consider the effects of a permanent change in group membership. However, temporary changes can also occur in work groups when people are transferred to another project group for cross-training or to substitute for missing members. Such short-term changes in membership provide another opportunity to investigate the relative importance of experiential, affective, and cognitive components of group identity. Applying the reasoning developed in detail above, we can make specific predictions for the relative strength of group identity at both the collective and individual level for groups with "guests" versus groups composed only of "regular" members.

7.1. Effects of member change on collective group identity

Based on the common fate or experiential component of group identity, a change in membership should make no difference to group identity as long as all members present share a common outcome. However, the other components should register a change in group identity based on changes in member composition.

The affective component of group identity, it was argued, develops over time as members form interpersonal bonds. When a regular member is replaced by a stranger in a job rotation or transfer, group identity should go down. When the regular member returns, however, we expect that pleasure at having the group back together should provide a short-term rebound in group identity. During the member switch week in the previous JEMCO study (McGrath, 1993), participants typically expressed a desire to get their regular group member back, even if they liked the guest.

The cognitive component of group identity emphasizes the salience of different components of social identity rather than affective ties among group members. The salience of in-group identity is enhanced when members are made aware of a contrasting out-group (Wilder and Shapiro, 1984). The presence of a guest from another group should provide the appropriate cue. For members meeting face-to-face, the replacement of a member is a highly visible change. For members communicating by computer, however, the replacement of a member is a less obvious and dramatic change, and thus a weaker cue. We expect any effects of temporary member change on group identity to be weaker, therefore, in CMC than in FTF groups.

Affective and cognitive influences thus lead to two contrasting hypotheses:

Affective Member Change Hypothesis (10a): Group identity will go down when a member is replaced, then rebound when the member returns. This effect will be strongest in FTF groups.

Cognitive Member Change Hypothesis (10b): In-group identity will be higher in weeks when a guest from a contrasting out-group is present. This effect will be strongest in FTF groups.

The reader will note that the simultaneous influence of the affective and cognitive components of group identity may also cancel out, leading to a finding of no difference between weeks.

7.2. Effects of temporary member change on guests

At the individual level, we can contrast the group identity scores of guest members when they are in a "foreign" group with their group identity scores when they are in their regular groups. By analogy with the group development discussion, we propose a set of hypotheses (end of this section) for effects of member change on guest group identity. In some cases, the influence of different components lead to the same prediction; in other cases, they lead to contrasting predictions.

The dynamic common fate component suggests that guests will have less group identity with their host groups than with their regular groups because they have no expected future with these groups. Similarly, we expect interpersonal attraction to be weaker between the guest and host members than between the guest and his or her regular groupmates (affective component).

The cognitive component suggests a cross-cutting interference between identification with an out-group (the host group) and an in-group (guest's regular group). However, this presumes that the switched member has strong group identity in their regular group. If the member who is switched has little attachment to their regular group, identifying with an alternate group may cause less cognitive interference.

Individual differences in group identification would lead to the opposite effect. Individuals with a strong tendency to identify with others around them are expected to have higher group identity than those who do not have this tendency, and we expect this to hold true for guests both in their regular and their host groups.

Guest Dynamic Common Fate (11a) and Affective Member Change Hypothesis (11b): Guests' group identity should be lower than their regular group identity.

Guest Affect and Medium Member Change Hypothesis (12): Changes in guests' group identity should be more pronounced in FTF than in CMC groups.

Guest Cognitive Member Change Hypothesis (13): Guests' identification with their host group should be negatively correlated with their regular group identity, with a stronger effect for FTF than CMC groups.

Individual Differences Member Change View (14): Guests' group identity should be positively correlated with group identity in their normal groups.

8. Measures

8.1. Group identity scale

Although a group identity scale used in other studies has been published (Hinkle et al., 1989), this scale was not included in the post-task or post-essay questionnaires that members filled out each week. Instead, we constructed a post-hoc group identity scale from 8 items on the post-task questionnaire. Each student was asked to rate, on a 7-point scale: how happy and pleased they were feeling during that session; how the group's interaction that day affected the group's task performance, the group's morale, and the group's interpersonal relations; what impact each member had on group cohesiveness and morale; how positive they were feeling about their group that day; and how friendly they were feeling towards every other group member.

Each student's ratings on these 8 items were summed to form a measure of group identity at the individual level. This measure was used for analyses testing the individual differences and guest member change hypotheses. Member scores were averaged to yield a collective group identity score. In weeks in which guests were present, we excluded the guest's individual score in calculating the collective group identity, and items assessing interpersonal attraction excluded the guest as a target. Internal consistency of our post-hoc scale, as indicated by the standardized item alpha, ranged from .84 in Week 6 questionnaires to .91 in Week 4 questionnaires. A separate study that included both the items from our post-hoc scale and the Hinkle Group Identity Scale found a correlation of .74 between the two scales (Arrow, in preparation).

8.2. Demographic diversity

Demographic diversity was assessed both for sex composition and racial/ethnic composition. For the former, groups were divided into two categories: homogeneous in sex composition (all male or all female) and heterogeneous (mixed male and female). For analyses of racial/ethnic diversity, we took the racial/ethnic identity reported by students and made pairwise comparisons between all members of a group, coding each pair as same or different. Then we divided the number of pairwise differences by number of pairs. This yielded a racial/ethnic diversity score ranging from 0 (most homogeneous) to 1 (most heterogeneous). For analyses of variance, we then partitioned the groups into three racial diversity categories, with cutoffs chosen to provide roughly equal numbers in the three categories: score of 0, score greater than 0 and less than .7, score of 0.7 to 1.

Table I. Results by hypotheses

Hypothesis		Result
GROUP DEVELOPMENT HYPOTHESES		
1.	Static Common Fate	Not supported
2.	Dynamic Common Fate	Supported, CMC and FTF, original
3.	Dynamic Affective	Supported, CMC, reconfigured
4.	Affect & Medium	Supported, FTF and CMC, reconfigured
5.	Social History Affective	Supported for FTF-to-CMC
6.	Demographic Diversity & Medium	Not supported
7.	Depersonalization & Medium	Partial support, original
8.	Cognitive Interference	Supported for FTF-to-CMC
9.	Individual Differences	Supported
MEMBER CHANGE HYPOTHESES		
10a.	Affective and 10b. Cognitive	Not supported, or canceling each other
11a.	Guest Dynamic Common Fate	Not supported
11b.	Guest Affective	Not supported
12.	Guest Affect & Medium	Not supported
13.	Guest Cognitive	Supported for FTF guests
14.	Individual Differences	Supported for CMC guests

9. Results

The overall pattern of support for 8 group development hypotheses and the 6 member change hypotheses is shown in Table I. Details of the analysis are summarized below.

9.1. Common Fate Experiential Component

The static common fate hypothesis (1), which proposed that group identity levels would not differ either between media or across time, was not supported. A 2 (CMC vs. FTF) by 2 (original vs. reconfigured groups) by 7 (week) repeated measures analysis of variance (ANOVA) showed a main effect for medium. FTF groups had significantly higher group identity (M = 5.19) than CMC groups (M = 4.73), $F(1,49) = 6.84, p < .02$. A two-way interaction of time and medium ($F[6,44] = 6.77$, $p < .001$) and a three-way time by medium by half interaction ($F[6, 44] = 3.63$, $p < .01$) indicated that group identity was not constant across weeks or across original and reconfigured groups (see Figure 3).

Separate analyses for original and reconfigured groups indicated a main effect for week ($F[6,21] = 4.95, p < .005$) and a medium by week interaction ($F[6,21] = 2.96, p < .03$) for the original groups. For the reconfigured groups, there was a main effect for medium ($F[1,23] = 9.12, p < .01$), and a week by medium interaction ($F[6,18] = 2.76, p < .05$). The effect of week did not reach traditional

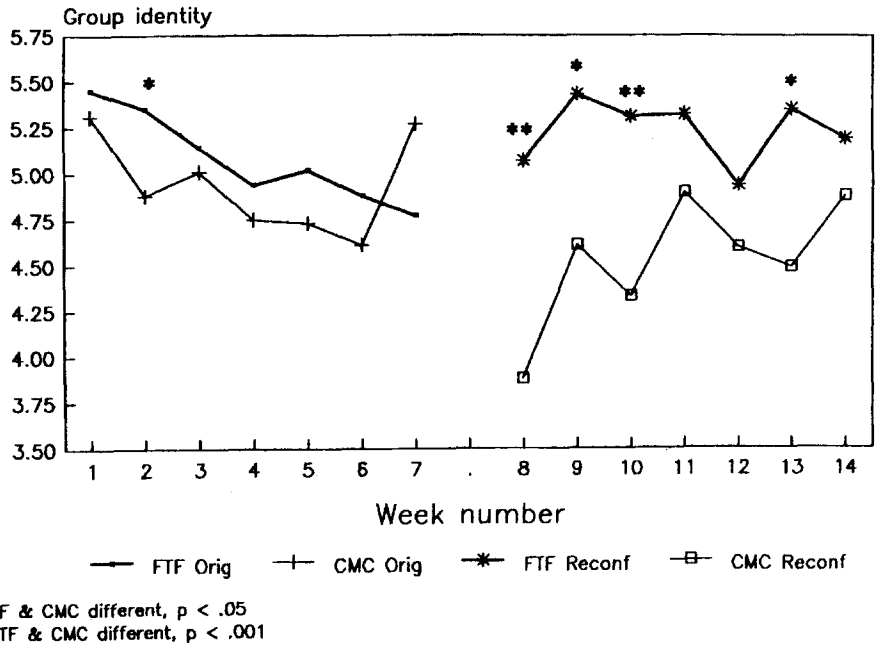

Figure 3. Observed group identity for original and reconfigured FTF and CMC groups.

levels of significance ($F[6,18] = 2.56, p < .06$). Week-by-week contrasts indicated significant differences between CMC and FTF groups in weeks 2, 8, 9, 10, and 13 (see Figure 3 for levels of significance).

The dynamic common fate hypothesis (2) proposed that group identity would decrease over time in both FTF and CMC groups. The groups that met for weeks 1–7 did indeed show a pattern of steady decrease, except for a jump in group identity for the CMC groups in the last week (see Figure 3). The group identity of FTF groups showed a significant linear decrease in the first half, $F(1, 13) = 32.57$, $p < .001$. CMC groups did not show a linear decrease across the first seven weeks. However, if Week 7 is excluded, a linear decrease is significant for the first 6 weeks, $F(1, 14) = 7.11$, $p < .05$. As a quick inspection of Figure 3 makes clear, this decreasing trend was not replicated for reconfigured groups in either medium.

9.2. Affective Component

The dynamic affective hypothesis (3) predicted that group identity would increase over time in all conditions. As indicated in the previous analyses, this was not supported for the original groups. It was supported for the CMC reconfigured groups. For the reconfigured groups a repeated measures ANOVA showed a significant linear increase in group identity for the CMC groups, $F(1,11) = 6.54$, $p < .03$. Group identity for the FTF groups was not different across weeks. This pattern of results is consistent with the affect and medium hypothesis (4), which predicted

higher group identity in the FTF groups early in a group's tenure, with the difference between FTF and CMC groups fading over time. The medium difference in the first week (Week 8 for these groups) was substantial, with FTF much higher than CMC (means were 5.07 and 3.88 respectively, $F[1, 24] = 16.90, p < .001$). By the last week (Week 14 for these groups), the difference was much smaller (means were 5.19 for FTF, 4.88 for CMC) and nonsignificant.

The social history hypothesis (5) predicted that group identity would be lower in early weeks for the reconfigured groups than it was in early weeks for the original groups. This was supported for members going from FTF to CMC groups but not vice versa. A 2 (half) by 2 (medium) ANOVA tested this hypothesis using mean group identity for the first two weeks of each set of groups as the dependent variable. Results indicate a significant interaction, $F(1,58) = 7.26, p < .01$, between medium and half, plus main effects for medium, $F(1,58) = 21.58, p < .0001$, and for half, $F(1,58) = 10.10, p < .005$. Figure 4 shows the interaction, with the average group identity plotted for both early (first two) and late (last two) weeks.*

Planned contrasts indicated that the first and second sets of FTF groups did not differ significantly in early group identity, but the first and second sets of CMC groups did, $t(29) = 4.67, p < .0001$. If we compare the original FTF groups with the reconfigured CMC groups (to which all members of the original FTF groups were reassigned), we find an equally strong effect, $t(28) = 5.58, p < .0001$. The FTF groups that were reassigned to new CMC groups show a drop in group identity when they first change media. Members of CMC groups that were reassigned to new FTF groups, however, start at roughly the same high level of group identity. In both conditions, group identity in the final two weeks is not significantly different between original and reconfigured groups.

9.3. COGNITIVE COMPONENT

The demographic diversity and medium hypothesis (6) proposed that demographically diverse FTF groups would have lower group identity than demographically similar FTF groups. We found no support for this hypothesis. We conducted separate ANOVAS for sex diversity (2 levels) and racial/ethnic diversity (3 levels), with medium and half as second and third factors in each analysis. No effect for the

* To test the possibility that the social history effect simply reflected the different sequence of task types encountered by the original and reconfigured groups, we ran a 3 (task type) X 2 (medium) by 2 (week) repeated measures ANOVA. For each set of groups, there were two weeks each with the following three task types: combined generate and judgmental (weeks 1 and 2 in first half, 9 and 14 in the second half); pure judgmental (weeks 3 and 7, first half; 10 and 13, second half); and intellective (weeks 5 and 6, first half; 8 and 12, second half). For the first half, task, week, medium, and the three-way interaction among them were all significant at the $p < .01$ level. For the second half, the two-way interaction of week and medium was significant at the $p < .05$ level; the task effect fell short of significance ($p < .06$). The significant difference between weeks with the same task type (and the interaction involving week) suggests that task type fails as explanation. Task type is confounded with week, and especially for the first half, tasks of the same type are clustered early or late in the group's history.

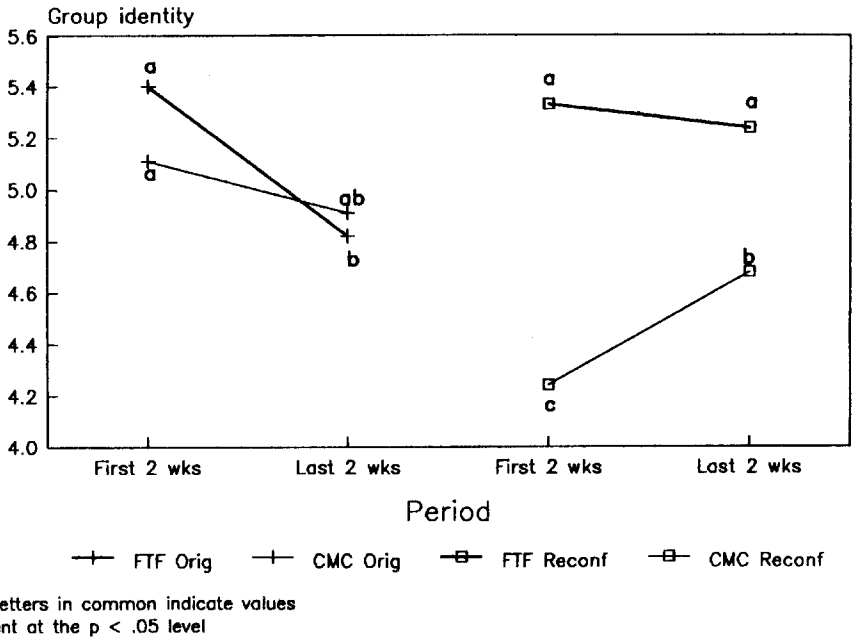

Figure 4. Early and late group identity in original and reconfigured groups.

different levels of diversity was found. Means for the different levels of diversity indicated that the differences were also not in the predicted direction.

The depersonalization and medium hypothesis (7) predicted that group identity would be higher in CMC than in FTF groups during the early weeks, but this difference would decline over time. This prediction was not supported. The hypothesis also predicted that group identity in both types of groups would decline, a pattern that did indeed occur for the original groups. As indicated above, in the original groups group identity decreased over time in both FTF groups and CMC group (with the exception of week 7). In the reconfigured groups, however, the CMC groups started out low in group identity and gradually *increased* over time while the FTF groups started with high group identity and stayed high. This pattern is not consistent with any of the predictions of the depersonalization and medium hypothesis.

The cognitive interference hypothesis (8) predicted the same result as the social history hypothesis (lower group identity in early weeks for reconfigured groups than in early weeks for original groups). As reported above, groups reconfigured from FTF to CMC showed the expected difference between early weeks for original and reconfigured groups, but no difference was found for the members switched from CMC to FTF groups.

9.4. INDIVIDUAL DIFFERENCES IN GROUP IDENTITY

The individual differences hypothesis (9) proposed that group identity would be positively correlated at the individual level across the two different groups in which a given person participated. Strong support was found for this hypothesis. To test this hypothesis, we measured the association between mean group identity for the first half and second half at the individual level, and found a significant correlation ($r = .42, p < .0001, n = 108$). Relatively stable individual-level tendencies account for a meaningful amount of variance in group identity across groups. Separate analyses for the two conditions (FTF original, CMC reconfigured versus the other way around), however, indicated that these individual differences were a much better predictor of group identity when people were in the CMC medium first. For participants in the CMC-FTF sequence, the correlation between mean group identity in the original and reconfigured groups was especially high, $r(53) = .63$, $p < .0001, n = 53$). The correlation for people moving from FTF original to CMC reconfigured groups was close to the level of the overall correlation, $r = .42$, $p < .005, n = 51$.

9.5. MEMBER CHANGE EFFECTS

9.5.1. *Group level*

Group identity levels for weeks 4, 5, and 6 were compared using a repeated measures MANOVA with medium as a between groups factor. No effect for week was found for either medium. Results are consistent with either no influence of member change on group identity or cancelling effects of weaker cohesion (predicted by the affective member change hypothesis, 10a) coupled with a stronger sense of in-group identity when a stranger is present (predicted by the cognitive member change hypothesis, 10b).

9.5.2. *Guest level*

The dynamic common fate (11a) and affective (11b) hypotheses for guests both predicted that guests' group identity should be lower than their "normal" group identity when in their regular groups. This was not supported. A comparison of group identity levels in regular groups (Week 4 and Week 6) and in their host groups (Week 5) revealed no reliable differences in either medium. The guest affect and medium hypothesis (12) predicted that differences in group identity would be more pronounced in FTF than in CMC groups. This medium difference was not supported for the relative *level* of group identity. However, different effects for the two medium were found in the patterns of week-to-week correlations in group identity for guests, as discussed below.

The cognitive hypothesis for guests (13) predicted a negative correlation in group identity between weeks 4 and 5 and between weeks 5 and 6, with a stronger

Table II. Correlations across membership change weeks

Comparison	Face-to-face		Computer-mediated	
	Guests ($n = 14$)	Regular ($n = 34$)	Guests ($n = 16$)	Regular ($n = 40$)
Baseline corr.	0.60^{*}_{a}	0.55_{a}	0.31	0.65
Weeks 4 & 5	-0.19_{b}	0.03_{b}	0.36	0.41
Weeks 5 & 6	0.56_{a}	0.39_{ab}	0.35	0.41

* Fishers r-to-Z transformation was used to compare correlations within columns, which are different at the .05 alpha level if they have different subscripts. Because this test does not take the repeated measures structure of the data into account, it is quite conservative.

effect for FTF than CMC groups. The individual difference hypothesis (14) , in contrast, predicted a positive correlation. Results supported the impact of individual differences for guests in CMC groups. For FTF groups, the impact of cognitive interference on guests was supported. Prior analyses for the general individual differences hypotheses had indicated an overall tendency for group identity to be positively correlated across groups. To detect effects specifically related to the temporary member change manipulation, we thus needed a baseline measure of typical week-to-week association at the individual level. Individual level correlations between weeks 2 and 3 and between weeks 3 and 4 were averaged to provide the baseline (see Table II for correlations). As predicted by the cognitive hypothesis (13), FTF guests' group identity with their regular (Week 4) and host (Week 5) groups was negatively correlated, and this correlation differed significantly from the baseline, indicating the member change manipulation was salient enough in the FTF condition to impact group identity. In CMC groups, the correlations for guests between weeks 4 and 5 was positive (in line with the individual differences hypothesis, 14) and virtually identical to the baseline, indicating that the member change manipulation may not have been salient enough in the CMC condition to significantly affect group identity.

We also did a post-hoc comparison to see whether the correlations involving a membership change week differed for the regular members who were not guests. In FTF groups, this was indeed the case, as the correlation between weeks 4 and 5 dropped from a high baseline to zero. For both guest and regular members of FTF groups, group identity in Week 5 was positively correlated with group identity in Week 6, when the traveling guest returned, suggesting the persistence of membership change effects rather than a simple reversion to the baseline level of week-to-week association for group identity.

10. Discussion

The results of this study reveal patterns of change in group identity and patterns of difference for groups in different communication media. Group identity started

high in the original groups and gradually declined for both media, with FTF groups being slightly higher throughout (with the exception of week 7). In the second half of the study, group identity started high for the reconfigured FTF groups and stayed high, but started low for the reconfigured CMC groups and gradually increased over time. If we had looked only at Week 1, we would have seen no significant difference between the media and concluded that the communication medium had a small, nonsignificant effect on group identity.

If we had considered only the entire 7-week history of the original groups, we would have seen similar patterns of gradual decrease in group identity across the two media (with the exception of week 7 for the CMC groups) and concluded that while FTF groups have consistently higher group identity than CMC groups, the difference is small, and the pattern of development similar (again, with the exception of Week 7).

Considering the study in its entirety, however, we find that even these reasonable conclusions might mislead us. The reconfigured CMC and FTF groups show patterns that are both different from the original groups and different from one another. For example, while the original FTF and CMC groups showed but a slight difference between media in their first week, the first week of the reconfigured groups shows a dramatic difference, the strongest among the 14 weeks. This media difference persists across the 7 weeks of the reconfigured groups, though its magnitude declines and group identity in the CMC groups improves. We conclude from these patterns that both medium and prior experience will impact group identity's development.

10.1. Usefulness of the Tripartite View of Group Identity

The set of hypotheses generated by the tripartite view of group identity allows us to sort out what might be generating the observed patterns of differences and of changes in group identity. The different components that contribute to group identity can be thought of as different mechanisms influencing the level of group identity at any particular time. Focusing on the components separately led us to different hypotheses about how group identity would change over time, and how it would differ across communication media. The tripartite view of group identity suggests that no one component will provide a full explanation. The relative importance of the different components may vary over time and media, and that is indeed what the results suggest happened in these groups.

10.1.1. *Dynamic common fate*

The dynamic common fate component was a good predictor for the development of group identity in the first half of the study, regardless of medium. This pattern suggests that the members of these groups were paying attention to common outcomes. The decrease over time indicates that over the duration of the group's

life, either the importance of these common outcomes declined, or else members perceived less interdependence of group members as the weeks passed. In early weeks, members knew they would have to work together for an extended period, and that they would be creating a group essay, for which all members received a common grade, each week. As the weeks passed, however, fewer essays were at stake.

In the last week of the original groups' history (Week 7), the CMC groups showed a sharp increase in the level of group identity. This cannot be explained by the dynamic common fate component. One possibility is that for some reason the affective component became more important to the CMC groups in the final week. Although not supported for the first 6 weeks, the affective hypothesis does predict an increase in group identity over time. Another plausible explanation is that the original CMC groups may have been looking forward to moving to the FTF condition in Week 8.

10.1.2. *Affective component*

The last week marked the end of what many students in the CMC condition felt was a challenging experience. Although they were familiar with computers, working collaboratively in a computer-mediated environment that permitted no face-to-face discussions was new for most students, and several commented in their essays that the computer impeded the development of relationships. When their time together was almost over, members of the CMC groups may have felt both relief at their impending transfer to FTF groups and special appreciation for their fellow CMC members with whom they had shared this experience. Consistent with this interpretation, the reconfigured CMC groups also had a significant increase in group identity for Week 14. Neither set of FTF groups show this "last meeting" effect.

In the reconfigured CMC groups, the development of group identity is also consistent with a strong affective component, as they start low and increase linearly over time. The reconfigured FTF groups do not conform to this pattern.

10.1.3. *Social history: The interference effect*

The lower initial group identity for the reconfigured CMC groups shows support for affective/cognitive interference due to previous allegiance to the original groups. The reconfigured FTF groups do not have lower initial group identity, however, which may be because the study design confounded reconfiguration with a switch to a different and more desirable medium.

For reconfigured groups, the contrast in early group identity between the two media may indicate the impact of social entrainment effects. If group members became socially entrained to a set level of effort, they exert comparable effort when they are switched to a different task or setting (Kelly, Futuron, and McGrath,

1990). The difficulty in establishing interpersonal ties varies for the different media (Daft and Lengel, 1986). Members of CMC groups had to overcome the relative lack of interpersonal cues to establish relationships with their new group members and attend to group well-being and member-support functions (McGrath, 1991). Thus members of the original CMC groups had to work harder than their FTF counterparts to establish group identity. If, when these individuals were switched to the new FTF groups, they continued to allocate a high level of effort to these functions, initial group identity should have been higher. That is indeed what we observed.

Members of the original FTF groups, in contrast, worked from the start in a medium that provides rich social cues (Daft and Lengel, 1986), facilitating the development of interpersonal ties and the emergence of group identity. If these individuals continued to allocate only the level of effort required by the FTF medium when they were switched to CMC, group identity would suffer. As they learned how to communicate more effectively in the CMC environment, a rise in group identity over time would result. This is the pattern that was observed.

10.1.4. *Combined effects of the three components*

Obviously, no single component of group identity prevailed under all circumstances. If we had considered the different perspectives on the sources of group identity to be competing and incompatible explanations, we would at this point be expressing our disappointment at the "mixed" results. Instead, we consider all of the components to be an aspect of a fuller, more complex view of group identity and its sources.

The tripartite view, then, is useful in that it does not demand that only one component be demonstrated across multiple meetings and media. Rather, it is flexible enough to help us identify when and where a given component is most important. It also provides some theoretical mechanisms for explaining different patterns of development.

The least support was found for the cognitive hypotheses (i.e., no support for the demographic diversity and only partial support for the depersonalization predictions). This may reflect a weakness in the measure of group identity used in this study as not focusing enough on the cognitive aspect of group identification. The items on the post-hoc measure primarily assessed affect and interpersonal relations, with less emphasis on cognitions about the group (as these types of items were not available). Future research should plan more carefully the relationship between the measure and the tripartite view to adequately assess the contribution of the cognitive view.

This paper leaves unanswered questions about how the three components might influence each other. Future research may use structural equation models to answer these kinds of questions. The present study did not have a large enough number

of cases per week to allow us to examine both development over time and causal models within each week.

10.2. Individual differences in group identity

Relatively stable individual-level tendencies to develop group identity account for a meaningful amount of variance in group identity (18 percent overall). This was especially true for individuals whose first experience in the study was in CMC groups. In this case, group identity in the original groups accounted for nearly 40 percent of the variance of group identity in the reconfigured groups. These results suggest that individual traits related to interpersonal and group orientation are powerful determinants of whether or not group identification will occur. However, the strength of people's group identity in FTF groups is a weaker predictor of their group identity when they are transferred to a group using computer-mediated communication exclusively. It seems probable that differential reactions to the new medium account for the weaker predictive value of prior group identity in this case.

The tendency to identify with an interacting group may reflect individual differences in allocentrism (Triandis, McCusker, and Hui, 1990; Triandis, 1994) and need for affiliation (Murray, 1962[1938]). This study provided no information on the strength of association between the group identity of members transferred permanently from one group to another using the same communication medium. It also did not measure allocentrism or need for affiliation directly. So our explanation for the individual difference effect is speculative at best. Using a different data set we currently are studying the relationship between allocentrism and group identity (Arrow, in preparation).

10.3. Temporary member change

While newly reconfigured CMC groups had low group identity, group identity in the original CMC groups was virtually unaffected by a temporary member change. In contrast, the tendency of FTF guests to identify with their regular groups and host groups was negatively associated. The differential response of guests in CMC versus FTF is consistent with affective influences on group identity.

This difference is also consistent with membership dynamics theory (Arrow and McGrath, 1994), which predicts that member change is a more important event in groups with more extensive social ties among members. With their higher group identity overall, it seems reasonable to assume that the members of FTF groups had stronger social ties, and thus the impact of the member switch manipulation was stronger in FTF than CMC groups.

11. Implications for research and practice

In this study, we found support for a more complex set of influences on group identity than are usually considered. We also found strong effects for the history of

both groups and individual members. Often in psychological research, experimental designs are used that treat people as though they have no history or memory. The prevalence of one-session designs that radically compress the time between "pretest" and "posttest" measurements suggest that history is treated mostly as a threat to validity (Campbell and Stanley, 1963; Cook and Campbell, 1979), and not as a topic of research interest.

People do have histories and memories, and the decision to treat individuals as "naive" participants with no prior history may seriously limit the generalizability of results. In fact, prior history is a pervasive influence on human social behavior. Removing the richness of detail from an environment improves precision but limits realism and generalizability (Brinberg and McGrath, 1985). To study the effects of history is to emphasize the latter two over the former. Change over time, indeed, only makes sense when social behavior is viewed as embedded in a group (and individual) social history.

The dramatic difference between FTF and CMC levels of group identity in the second half of the study may in part be due to how well groups using different media cope with change. Some studies indicate that CMC groups are more "brittle" than FTF groups in their ability to adapt to change. CMC groups appear less able to cope with early membership change (Arrow, 1995) and less able to adapt to multiple changes at once (Hollingshead, McGrath, and O'Connor, 1993). During Week 8, both sets of individuals were dealing not only with new groups but also new media. Those in the CMC groups had the most difficulty adapting. Research comparing structured and unstructured groups using computer support systems (Arunachalam and Dilla, 1992) and geographically dispersed groups using both computer and video-conferencing (Armstrong and Cole, in press) provide a clue that a more elaborated structure may buffer the brittleness of CMC groups.

Our findings for the individual difference component imply that high group identity may depend strongly on a stable individual difference – possibly the degree of allocentrism or need for affiliation among the members that compose a group. Since allocentrism/idiocentrism are individual correlates of a cultural level construct, this raises the possibility that the development of group identity may vary across cultures.

The pattern of results observed here also has strong implications for changes in groups' communication media. Levels of group identity for members who have been working in a dispersed CMC group are likely to carry over if they are reassigned to new groups that meet face to face. As discussed earlier, this may be due to social entrainment and contrast effects for individual members. Reassigning people accustomed to working in face-to-face work groups to new groups that keep in touch via computer is likely to have less positive effects. Because of the confounding between reconfiguration and change in medium, however, we are unable to predict the response of intact groups that change from one medium to another.

As social psychologists, we deal with a complex and changeable subject matter. Mixed results are common, as the pattern obtained in one set of circumstances fails to recur in another. We need to devote more attention to just what aspects of a phenomena such as group identity are important in different circumstances. The type of communication medium can be an important element of this context. By considering the joint contributions of communication medium, expected future, and past history to the development of group identity, meaningful qualitative patterns can be discerned. These patterns reveal important regularities in the dynamics of group identity. Which pattern will emerge, however, may depend on the particulars of the situation, including the social history of group members, individual differences among members, and how long group members expect to continue their collaborative work.

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