Building Collective Communication Competence in Interdisciplinary Research Teams
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Using a grounded theory approach, this investigation addresses how an interdisciplinary research (IDR) team negotiates meaning and struggles to establish and sustain a sense of collective communication competence (CCC). Certain communication processes were foundational to building CCC, such as spending time together, practicing trust, discussing language differences, and engaging in team tasks. Demonstrating presence, engaging in reflexive and backstage communication, and shared laughter facilitated and often expedited CCC development, whereas sarcastic humor, unproductive debates of expertise, expressions of boredom, and jockeying for power challenged and deteriorated the team’s CCC.

Keywords: Collective Communication Competence; Interdisciplinary Communication; Interdisciplinary Research Team; Ethnography; Grounded Theory

Interdisciplinary research (IDR) is becoming increasingly necessary due to the societal and scientific complexities of problems. However, IDR projects can be challenging for academic experts, who are typically trained in a specific field of theories, methodologies, and research processes. Team members must negotiate how to communicate in order to generate interdisciplinary knowledge. Scientific expertise is typically excellent; what is often crucial but lacking, is effective management of the communication and collaboration processes (Markin, 2005).

The National Academies of Science (NAS, 2005) calls for a communication-based understanding of IDR processes: “At the heart of interdisciplinarity is
communication—the conversations, connections, and combinations that bring new insights to virtually every kind of scientist and engineer” (p. 19). Funding agencies are recognizing that there has been little systematic study of the people and institutions engaged in IDR projects. Meanwhile, communication scholars have spent decades studying the communication dynamics within institutions and organizations. Interdisciplinary research teams need expertise in communication to help facilitate collaboration and complex problem solving.

Much of the current literature and research on communication competence focuses on interpersonal, relational, organizational, and pedagogical contexts. This study is an ethnographic exploration of the communicative and collaborative processes in an academic IDR team. Similar to Ellingson’s (2003) study of interdisciplinary health care teams, this study describes and analyzes a bona fide team in action. Bona fide teams exist within a larger social system. They embody symbiotic, interdependent, and dynamic relationships among team members and within the larger organizational context (Putnam & Stohl, 1990). Further, Jablin and Sias (2001) suggest there is value in describing the dynamic interrelationships among behaviors that enhance collective communication competence (CCC); however, “few studies have explicitly explored communication competence at the group and organizational levels of analysis” (p. 824). This study seeks to reveal aspects of one team’s struggle to build and maintain a sense of CCC.

**Interdisciplinary Academic Research Teams**

Jantsch (1980) argues that IDR transcends the static nature of disciplinary research where problems are solved and “put on the shelf for later use” (p. 304). Historically, academic IDR was linked with government agencies and industry. Such agencies and organizations were the first to financially support problem-focused research. Klein (1996) explains that the Manhattan Project required a rare level of collaborative effort among science, industry, and the government. The prestige of wartime projects enhanced the status of IDR and new laboratories sprouted across the nation: nuclear science at Chicago and MIT, biophysics at Pennsylvania, marine physics at UCLA, and atomic research at Iowa State. After the National Science Foundation (NSF) was founded in the early 1950s, federal support for applied IDR also increased (Klein, 1996).

Through the 1970s and 1980s funding grew, opportunities for IDR grew, and studies of interdisciplinarity and interdisciplinary group processes soon followed. There has been substantial research and theorizing regarding IDR team dynamics (Klein, 2003). Some studies have focused on challenges to interdisciplinary teamwork (e.g., Kostoff, 2002; Turner & Carpenter, 1999; Wear, 1999) and opportunities for interdisciplinary success (e.g., Benda et al., 2002; Pickett, Burch, & Grove, 1999). The findings from the majority of these studies suggest that effective small group communication processes are fundamental to a team’s success.

Research in small group communication began in the 1950s (e.g., Bales, 1950) with a focus on group decision making. Bales (1950) explains that group communication
often shifts between discussion about the task at hand and the relationships among the
group members as the group balances the demands of task completion and group
cohesion. Since then, many scholars have investigated such tensions in small group
communication and communication competence research. (For a comprehensive
review of recent small group communication research, theory, and perspectives see
suggest that a group’s development depends on the task complexity, leadership
structure, and cohesion among members. Hirokawa (1985) illustrates that groups
negotiate tensions and make decisions relative to their mutually agreed upon
framework for examining the task and potential solutions. Hirokawa, like Poole,
explained that these decision processes do not need to occur in any particular order.
Recognizing the nonlinear nature of small group communication and decision making
is at the heart of systems-based understandings of small group communication.

Many communication scholars (e.g., Fisher & Hawes, 1971; Tubbs, 2001) use
systems theory to explain the complexity of small group interactions. Small groups,
such as an IDR team, are complex and dynamically changing and the principles of
systems theory can help to understand the communication processes and nonlinear
relationships in such interactions.

Communication research that embraces a systems perspective concentrates on the
categories, forms, and sequential patterns of message behavior, rather than on the
cause-and-effect relationships between communication variables (Krone, Jablin, &
Putnam, 1987). The patterns of behavior take place within a communication system
and are the elements that define the system. Changes in behaviors within one part of
the system can alter the character of the entire system. Krone et al. (1987) build upon
the work of Karl Weick (1979) and explain that a systems perspective in the social
sciences is distinguished by its emphasis on time, the sequence of contiguous
messages, the probabilities that sequences of interacts and double interacts occur in
social interaction, and the patterns of interaction in recurring cycles. Weick’s
articulation of time and the value of understanding time relative to communicative
acts is a necessary component for understanding CCC within the team presented in
this study. Another sensitizing concept that influenced my interpretation of this
team’s communication was the elusive and ever-changing work on communication
competence.

Although a popular and pervasive concept in the communication literature,
defining communication competence remains a fuzzy endeavor (Jablin & Sias, 2001).
Within the field of communication, there are multiple theoretical and operational
approaches to studying competence, yet there is a lack of consensus regarding the
nature of communication competence (Spitzberg, 1988). Spitzberg (1988) defines
communication competence as the “ability to interact well with others” (p. 68). He
explained that the term “well” refers to “accuracy, clarity, comprehensibility,
coherence, expertise, effectiveness and appropriateness” (p. 68). Rubin (1994) defines
communication competence as “an impression formed about the appropriateness of
another’s communicative behavior” (p. 173). Parks (1994) extends Rubin’s definition
to include the perception of satisfaction in achieving one’s goals, both in
communication and otherwise. Communication competence, for Parks, “represents the degree to which individuals satisfy and perceive that they have satisfied their goals within the limits of a social situation without jeopardizing their ability to pursue more important goals” (p. 595). Jablin, Crude, House, Lee, and Roth (1994) build upon these perspectives to develop a resource-oriented view of communication competence. They define communication competence as “the set of abilities, henceforth termed resources, which a communicator has available for use in the communication process” (p. 125). Such resources include (a) knowledge of appropriate norms and rules, (b) ability to engage in cognitive differentiation, (c) perspective taking, and (d) encoding, and decoding of messages. Canary, Cody, and Manusov (2000) provide six criteria for assessing competence: (a) adaptability, (b) conversational involvement, (c) conversational management, (d) empathy, (e) effectiveness, and (f) appropriateness. These six criteria create a holistic understanding of the interrelated behaviors that lead to communicative competence. Ultimately, defining communication competence is related to understanding the context of the interaction (Rubin, 1994) and communication norms may be successful in one situation and not perceived as competent in a different setting or with a different group (see Spitzberg & Cupach, 2002, for a comprehensive review of communication competence in the context of interpersonal skills, and Jablin & Sias, 2001, for an in-depth review of communication competence from an organizational perspective).

Integrating these definitions helps to begin theorizing about CCC. CCC is based on the idea that there are numerous interrelationships among communicators, contexts, goals, and the participants’ abilities to simultaneously be appropriate and effective. This study attempts to extend our understanding of communication competence in group and team contexts. With that goal in mind, the following research questions are offered:

**RQ1:** What communication processes influence an interdisciplinary academic research team’s ability to create collective communication competence?

**RQ2:** What communication processes appear to hinder the development of collective communication competence?

**Method**

**Setting and Participants**

This study is part of a larger ethnographic investigation of communication and collaboration processes in an IDR team at a large public university in the Western United States (Thompson, 2007). I was a participant-observer for over four years, serving as the interdisciplinary graduate research assistant. I assisted the team in their effort to integrate knowledge about human behaviors related to the production of greenhouse gas emissions in urban areas.

Addressing issues of urban air quality, greenhouse gases, and natural, as well as human impacts on climate change required the expertise of multiple disciplines.
The interdisciplinary team members designed a research agenda that included measuring the concentrations of emissions and pollutant gases, tracing their origins, and integrating that data into a computer simulation model and hosting a series of public outreach workshops to solicit input from local stakeholders. My major responsibility in the team was to assist in developing and facilitating the outreach workshops by translating scientific findings for the team members and stakeholders. Much of my work was focused on taking notes and facilitating team meetings, coordinating scientific poster sessions, and assisting in systems model building activities.

The team was led by five principal investigators (PIs), 14 co-investigators, and nine graduate students. Participants represented 12 disciplines including biology, chemical engineering, civil engineering, communication, ecology, geography, hydrology, material science engineering, mechanical engineering, meteorology, psychology, and urban planning. The participants ranged in age, university rank, and IDR experience.

The lead-PI was in the College of Life Sciences, a second PI was in the College of Engineering, a third was in the physical sciences, a fourth in the social sciences, and the fifth was in the College of Humanities. Three of the PIs were senior, tenured faculty members and two were full-time research scientists. Each PI was in charge of one of the team’s subgroups. These subgroups were organized around specific aspects of the project, including: (a) measuring greenhouse gas emissions (measurements subgroup), (b) modeling the urban ecosystem (modeling subgroup), (c) preparing a series of outreach workshops (outreach subgroup), (d) devising emissions management policies (emissions management subgroup), and (e) the steering committee subgroup oversaw data integration. In an attempt to protect the identities of the participants in this case study, team members will be referred to by their role or position in the team.

As the project evolved, I was able to take rich ethnographic notes on the team’s communicative and collaborative interactions. My role was truly one of participant-observer (Lindlof & Taylor, 2002). For example, I coordinated poster sessions for a series of outreach workshops. I met with 12 team members and helped to translate their data into public-friendly presentations. Through this process, I gained access to many team members. They invited me into their offices and laboratories; I used those invitations as opportunities to ask questions about their expertise, research, and experiences working on the project. These informal, ethnographic interviews led me to pursue a deeper investigation of communication competence in an IDR team.

**Data Collection**

I used a combination of research methods, but the primary data collection process was ethnographic (Lindlof & Taylor, 2002). I outlined my research focus and methodology with two members of the research team and we submitted it to the University’s Institutional Review Board. It was approved in September 2002 and renewed until October 2006. I also submitted a formal memo to the PIs and the memo was made available to all team members. In this memo, I detailed my research
interests and explained my role as an ethnographic participant-observer, outlining my goals for studying the project.

I began taking field notes and participating in the interdisciplinary team in November 2002. Over the course of four years, I took approximately 462 pages of typed, single-spaced ethnographic notes and attended nearly 185 hours of team meetings, retreats, and informal gatherings. The lead-PI informed the team of my role as a participant observer at the first all-team member meeting I attended in November, 2002. From that day, members of the team voluntarily approached me with comments, observations, and frustrations related to interdisciplinary communication and teamwork. Memos of these side conversations were also included in my field notes. The majority of my field notes came from the large, project review meetings, but I also took a substantial portion of notes during informal, subgroup meetings and after casual conversations. Ellingson (2003) suggested it is necessary to investigate the backstage in order to understand team relationships and analyze interdisciplinary teamwork in action.

Data Analysis

I entered the team setting with a familiarity of research and literature on interdisciplinary teams, small group communication, and communication competence. The research project is guided by an integration of multiple definitions of communication competence from interpersonal, small group and organizational scholars (i.e., Canary et al., 2000; Jablin et al., 1994; Parks, 1994; Rubin, 1994; Spitzberg, 1988). This literature guided my interpretation of the team’s communication processes, but I did not use this scholarship as a structured framework to test my observations. Instead, I took a grounded theory approach to interpreting the communication processes. Research on interdisciplinary teams, small group communication and communication competence were sensitizing concepts, or starting points for my interpretation and analysis (Bowen, 2006). Grounded theory is a research approach that calls for continual interplay between data collection and analysis in order to produce a preliminary theory about a communicative process. In this case, I was attempting to identify the communication processes that facilitate or challenge communication competence in an IDR context.

Using the steps outlined by Strauss and Corbin (1990), I began by reading and coding my field notes. Then I developed inductive categories, revised the categories, wrote memos to explore preliminary ideas, continually compared parts of the data to other parts and to the literature, collected more data, fitting it into categories and noting where it did not fit and revising the categories. To develop categories of CCC, I read through my field notes three times, noting and comparing similarities and differences in the initial open codes and continually refining the typology. The categories were then discussed with a handful of members of the IDR team, three of whom were also members of my doctoral supervisory committee. Their involvement was important because they were part of the team and they encouraged me to regularly check my observations and assumptions. After checking my assumptions
with a majority of the team in March 2005, I listed and detailed the categories, subcategories, and relationships among them; I also noted the context, conditions, and consequences of each category in order to better understand how the categories overlapped and intersected.

Because of my position as both a participant in the team and an observer of the team, I was forced to continually negotiate my positionality while gathering and analyzing data. According to Strauss and Corbin (1990), this process enhances theoretical sensitivity and increases the researcher’s awareness of subtleties in interpreting the data. Besides positionality, my theoretical sensitivity was also influenced by familiarity with literature on IDR teams, small group communication, and definitions of communication competence. Again, I was cognizant of this work, but maintained my goal of theorizing on communication processes necessary to build communication competence within the team.

After several meetings, discussing my observations with members of the interdisciplinary team, I believe I captured a representative sample of the team’s communication experiences. After a formal presentation to the team in March 2005, participants expressed agreement that the categories appeared to be systematic, reflexive, and inclusive of their experiences.

Results

To address the two research questions, I condensed the major communication processes into two broad categories: processes that facilitated CCC and those that hindered it. Among the processes that facilitated building CCC, there appeared to be some fundamental or foundational processes and a few other processes that expedited CCC development. In all, the facilitative processes composed 74% of my field notes, with foundational communication processes representing approximately 46% and expediting processes representing 28% of the data. Foundational processes included: (a) spending time together (27% of CCC foundation notes; 12% of total notes), (b) practicing trust (12% foundation; 5% total), (c) task talk (43% foundation; 20% total), and (d) negotiating meaning through discussions of language differences (18% foundation; 8% total). The expediting facilitative processes included: (a) demonstrating presence (25% of facilitating notes; 7% of total notes), (b) reflexive talk (43% facilitating; 12% total), (c) backstage communication (15% facilitating; 4% total), and (d) shared humor and laughter (16% facilitating; 5% total).

Processes that challenged the team's CCC development accounted for 27% of my field notes and included: (a) negative humor and sarcasm (11% of challenges; 3% of total notes), (b) debating expertise (21% of challenges; 6% of total), (c) communicating boredom (18% of challenges; 5% of total), and (d) jockeying for power (49% of challenges; 13% of total). The challenging processes forced the team members to continually negotiate their standards of CCC, accepting procedural knowledge and cognitive effectiveness over sensitivity and commitment to appropriate communication behavior performance. In some cases, the challenging processes degraded CCC to
the extent that interpersonal relationships among team members deteriorated completely.

_What Helped? Communication Processes that Facilitated CCC Foundational Processes_

**Spending time together.** The first requirement for team building and developing communication competence is to spend time together. I observed that members who were open and willing to learn from each other were also willing to, and enjoyed, spending time together. One’s willingness to spend time was related to external variables such as the resources available and the amount and types of outside resistance members felt. Team members repeatedly told me that they felt that they did not have enough time to discuss, connect, and explore ideas with other team members. Other team members, who were initially excited about the project and participated regularly in early meetings, later disclosed in interviews that they did not have time to commit to this project on top of all of their other academic duties. Spending time together in a shared space provided a foundation for CCC.

**Practicing trust.** The team members openly discussed their desires for trust and the consequences of a lack of trust. As a variable of CCC, trust is quite complex; although individual actions and comments sometimes illustrated trust, trust appeared most evident through series of accumulated communicated exchanges.

Meyerson, Weick, and Kramer (1996) articulated the theory of swift trust for temporary teams, formed around a common task with a finite life span, such as the team in this case study. According to Meyerson et al., such teams consist of members with diverse skills, with a limited history of working together. These teams work under tight deadlines and this leaves little time for relationship building so members import trust from previous experiences instead of building bona fide interpersonal trust. It seemed that the PIs in this team had developed a sense of swift trust while writing the project proposal. A co-PI explained:

> When we wrote the proposal it was just [the lead-PI] and I. We brainstormed people to work with, but we really didn’t know them. We just had to trust that they were the right people. Some were; some weren’t.

As the project progressed, swift trust needed to evolve to interpersonal trust in order to be sustainable. Some members of the team developed relationships with one another that ranged from complete trust to complete mistrust. This transition was gradual and unique for each individual team member. As an underlying element of CCC, members suggested that they needed a certain level of trust to continue moving the project along, but expressed discouragement because of an overwhelming lack of trust. Even outsiders recognized the problem. The external advisory board mentioned the lack of trust in their report to the team. “The team needs more trust. If they want to go further they need to get the courage to speak up and build relationships.” Thus, building CCC was interdependent with building trust. In this team, trust required competent communication, and competent communication required that the team members trust one another.
Task talk. Much like spending time together, it is obvious how talking about the tasks and scientific aspects of the project would help the team members develop CCC. Based on the definitions of communication competence that I subscribed to, the team needed to practice both task talk and relational talk. If the team spent all of its time building relationships and working on the socioemotional aspects of CCC, they would not be competent communicators because they neglected conversations about the science and content of their research project. As predicted, an overwhelming percentage of team meetings and conversations were devoted to task talk, and a substantial amount of task talk was directly related to discussions of language differences, which are also foundational to building CCC.

Discussions of language differences. A major obstacle in IDR is that it is difficult to find a common language because of disciplinary specialization. Many scholars have explored the challenge of language differences in collaborative research projects (i.e., Benda et al., 2002; Glantz & Orlovsky, 1986). Differences in definition often led to miscommunication; therefore, discussions of such differences are foundational to developing CCC. Before this team could engage in collaborative problem solving, it had to analyze and question definitions and terminology related to the problem. One of the coinvestigators explained: “Sometimes our specialized language interferes with real communication . . . . Can we find ways to exchange ideas and insight that transcend traditional language, or at least the jargon of our discipline?” This example illustrates the process of discussing task-related language differences:

- Coinvestigator 1: I’m having a real difficult time finding literature on thermal inertia in the geological journals . . . the only things that come up are studies on Mars!
- Coinvestigator 2: (looking directly at her, head tilted, arms folded and his body extended forward across the table, he spoke with a frustrated tone) This is one of those times that we need to define terms!
- Co-PI 1: Yeah, [Coinvestigator 2] has a point, because in my field thermal inertia is . . . (he continued to explain the definition and applications in tremendous detail).
- Coinvestigator 2: (interrupting) Whoa, that is even different from how we would use the term . . . there is certainly a language barrier here!

This open exchange about language differences appeared to be necessary for CCC, but it also required a sufficient amount of trust and reflexive communication to keep the discussion educational and not confrontational. This example is evidence that a difference in terminology is more than a language-based difference, it illustrates that people from different scholarly backgrounds assign qualitatively different meanings to the same term. Transcending such differences requires recognition, reflection, and negotiation of meaning, especially in interdisciplinary contexts.

Spending time together, practicing building trust, talking about the task, and discussing language differences were foundational to building CCC in this team. It was through such discussions that the team learned and negotiated shared standards for communicating in an interdisciplinary context. The mutually agreed upon
standards for communicating allowed team members to move out of their towers and across their bridges in order to connect with one another.

Expediting Processes

Beyond building the foundation for CCC, the team members also engaged in communication processes that rapidly facilitated CCC development. These communication processes were at the core of a nuanced and context-based capacity for CCC; they included demonstrating presence, reflexive talk, backstage communication, and shared humor and laughter.

Demonstrating presence. Senge, Scharmer, Jaworski, and Flowers (2005) articulate the idea of presence in an organizational context, which involves “deep listening [and] being open beyond one’s preconceptions and historical ways of making sense” (p. 13). Presence is one’s ability to engage in collaboration while being open to experiencing profound, collective change. Participant presence in this team was evidenced by an expressed motivation to learn, listen, and see the world differently through engagement in collaborative learning experiences.

In this team, demonstrations of presence appeared to be contagious. At an early team meeting, a coinvestigator arrived joyfully. Nearly galloping into the meeting, he immediately pulled some papers out of his bag and said with excitement: “I’ve got air quality data from [local state agency]!” The lead-PI immediately showed a smile from ear to ear and her eyes grew big with excitement. The team members proceeded to go through the papers and looked at comparisons from that day and the day before. The lead-PI was practically jumping out of her seat. The group’s voices were enthusiastic and grew higher in pitch with each exchange. They were moving their hands so fast that I could not tell whose fingers were whose. This high-energy exchange illustrates how one team member’s presence rippled through the team, creating a wave of enthusiasm and encouraging a deeper sense of CCC.

Reflexive talk. Reflexivity and reflexive communication are terms used to conceptualize the idea that humans, as participants in a social system, are able to observe, reflect upon and ultimately affect change within their social system and is foundational to contemporary definitions of communicative competence. Reflexivity requires a subjective process of self-consciousness inquiry and an awareness of social behavior and its impact on group dynamics. Reflexive talk is a useful process to mitigate the potential pitfalls of groupthink in a team. In this team, it appeared that reflexive communication helped members reinforce their mutual trust and gain confidence sharing individual perspectives and insights. The following is an example of reflexive talk at a project review meeting:

Co-PI 1: Let’s think about how all of this fits together.
Advisory Board Member: (interrupting) I’m just impressed by all of these presentations, they indicate that links are already there. You’re talking to each other and that is the first and most important step.
Coinvestigator 1: (joking tone) It didn’t come easy! At first it was in Swahili!
(Everyone laughed)

Co-PI 2: The modelers have forced us to think about the basic relationships and concepts which has been extremely helpful in the first stages of this project.

Coinvestigator 2: May I add to that? This meta-analysis allows us to talk to each other, which is almost as important as taking measurements. In any circumstance, it is helpful to see interesting links and questions.

In postproject interviews, a few team members remembered this meeting and cited it as an example of reflexivity that renewed enthusiasm for shared learning among the team members. Reflexive communication is related to other variables of CCC, such as presence and shared humor. I frequently saw humor in examples of reflexivity (i.e., the Swahili comment) and it appeared that humor helped to keep reflexive communication from being overwhelming for the team members. Similarly, back-stage communication and discussions of language differences were embedded in the team’s reflexive communication.

**Backstage communication.** Backstage communication includes any communication exchanges that happen behind the scenes or not within the formal setting of official team business. Backstage communication provides opportunities for social-emotional discussion that allows team members to become more familiar with each other. When group members stop talking about the task and decide to discuss their own interpersonal needs, experiences, and orientations then they are engaging in backstage talk. For example, for several weeks, the team met at a pizzeria across from campus. During one of those meetings, task talk was interrupted as the team members watched a group of a dozen high school cheerleaders come into the pizzeria. The following excerpt from my field notes captures some of the team’s backstage communication dialogue:

Co-PI 1: (interrupting the discussion about data collection) What is the “B” on their jackets for?

Co-PI 2: It’s their varsity letter . . . didn’t you have varsity letters?

Co-PI 1: I grew up in Canada and there was no such thing where I went to high school.

Co-PI 2: Oh, so you didn’t have to experience the athletic-snobbery of rural secondary education?

Co-PI 3: In New York [City] there wasn’t room for athletic programs, so it wasn’t a big deal.

Co-investigator: In Europe sports teams are organized outside of school . . .

Graduate Student: I went to high school in Texas . . . high school football rivalries plagued my childhood.

Conversations like these were emergent, spontaneous exchanges that brought diverse members of the team together. Often teams do not take time to share personal experiences and engage in interpersonal bonding, but it proves to be a valuable component in an interdisciplinary team’s development of CCC.
Humor and shared laughter. Humor is part of our ability to take advantage of inconsistencies and incongruencies. In a small group or team, humor can be used to relieve stress, support group ideals, integrate ideas, and show support for common values (Bolman & Deal, 1991). Humor can be used to bring out potential problems before they become big problems. Joking and laughing can help to build a sense of community and cohesiveness within a team, and cohesive groups work together better in pursuing common goals.

In this team, humor appeared to ease tension and strengthen bonds threatened by conflict or fear of failure. Shared laughter often led the team to engage in open communication and trust-building interactions. The first evidence of humor I spotted was nearly six months into the project. In this situation, the team members used humor to reduce the tension of an escalating conflict regarding making a decision about where to collect greenhouse gas emission data. The team needed to identify three locations in the local urban area to build data collection towers. These towers would be specific sites where members of the team could set up atmospheric data gathering instruments. The team encountered many problems during this process. The first problem was that each scientist had different requirements for an ideal location. The second problem was that finding available property or getting permission to put up towers in urban neighborhoods was more challenging and time intensive than anticipated. As conflicts over where, when, and how to select sites ensued at this meeting, one of the co-PIs became agitated and grumbled: “We need to make some decisions about our sites.” The bickering continued as the scientists debated where specific locations were on a map of the area. The same co-PI that showed his agitation became more frustrated as evidenced by fidgety body mannerisms and vocal tone. He began to debate with another co-PI about where a specific elementary school was located. Finally, the second co-PI explained how the frustrated co-PI was wrong. In a fearful moment, when the tension could have exploded, the frustrated co-PI burst into laughter. The laughter lightened the mood and soon everyone made jokes about the site selection process:

Coinvestigator 1: We should select a site that we can ride our bikes to so that we don’t generate any pollution on our way. . . . Can you just see [team members] with their CO₂ flux instruments on their bicycles?!  
Co-PI: Yeah, we could all ride over to the West side and hope that we don’t get jumped on our way!  
Coinvestigator 2: Yes! I vote for the ghetto! I love it over there!

Everyone in the room was laughing and giddy. For the first time that I had observed, the team members utilized humor to alleviate a potential conflict and move the group toward making a mutually acceptable decision.

What Hindered? Processes that Challenged CCC Development

Many of the communication processes enhanced CCC, but others degraded the development of CCC. Challenging processes included negative humor and sarcasm, debating expertise, communicating boredom, and jockeying for power.
Negative humor and sarcasm. Just as positive forms of humor benefit the team, negative forms of humor can have the opposite effect—decreasing trust, morale, creativity, and communication. The following field note example illustrates how sarcastic humor can destroy an opportunity for shared learning and further discussion:

Coinvestigator 1: (Presenting research on health impacts of poor air quality, he also introduced various medical conditions linked to urban pollution issues.)

Coinvestigator 2: (raised hand and asked question) In your research, have you come across anything that identifies a link between obesity and suburban sprawl?

Coinvestigator 3: (interrupting) Sprawl in an airplane seat! (some people laughed)

Coinvestigator 2: (reframed his question) I mean, it seems that people walk less and drive more when the city sprawls, and now one-third of adults have diabetes.

Coinvestigator 3: (Before Coinvestigator 1 could respond, the interrupting jokester quipped) And 100 percent of people will die (sarcastic tone).

In this example, humor was used to shut down conversation and reject the validity of Coinvestigator 2’s concern. A handful of team members laughed with the interrupting jokester, but a larger number expressed concern, almost shock, in their facial expressions. Humor is a complicated variable; it can both help and hinder a team’s development of CCC. Positive humor used to diffuse conflict helps team members learn how to effectively communicate, whereas sarcasm and comedic outbursts challenge the team’s CCC.

Debating expertise. Debates of expertise were seldom scientifically based. In more cases than not, debates of expertise appeared to be more related to maintaining one’s ego than addressing the task at hand. One of the team members suggested that the ingrained sense of expertise created and maintained by the academy, as well as individuals’ identities and team status propelled many of the debates within this team. This could represent a tension common to many IDR teams, where members use their individual expertise to maintain their identity and boundaries within the project. Such a dynamic creates a dialectical tension that each team member must confront: the need to maintain expert status in a single niche and the need to share and teach other team members about one’s discipline and knowledge.

Unfortunately, this team confronted many conflicts that did not advance interpersonal or interdisciplinary understanding. For example, one of the coinvestigators, a civil engineer and specialist in intelligent traffic systems, was presenting his research on traffic patterns at one of the measurement sites. His presentation included many statements such as this: “Just tell us where you want us and what data you want . . . we can collect anywhere and analyze anything.” He continued by describing some of the humorous aspects of his data collection: “The snow removal trucks took out some of our equipment on Foothill Boulevard.” As he continued to
detail his lab’s findings, explaining the nuances of rush-hour traffic and average speeds, the other team members interjected their experiences:

Co-PI 1: It seems like people drive faster heading into the city and slower heading out . . .

Co-investigator 1: Don’t diesel trucks emit more carbon dioxide than cars.

(Similar statements and questions continued and the presenter graciously
presented Coinvestigator: (after 15 minutes or so, he snapped) What’s going on? Suddenly everyone is a traffic expert? During [the lead-PI’s] presentation no one knew what the isotropic carbon fluxes were, so you all sat nodding your heads and now you aren’t letting me get through my business.

The presenter’s frustration was emblematic of the team’s tendency to question and attack some researchers’ expertise, while blindly accepting the expertise of others. This coinvestigator eventually phased himself out of the project, which might have been due to the continual challenges to his work. In a postproject interview, I asked him what the most frustrating aspect of the project was for him. He responded: “[The] inability of specialists to explain their fields to me.” This team member felt that he had gone beyond the call of duty to make his expertise accessible to all members of the team, but that others worked to protect their expertise to the extent that it inhibited CCC and ultimately the creation of interdisciplinary answers to the team’s research questions.

Communicating boredom. Behaviors that demonstrated boredom and blatant disinterest also challenged the team’s communication competence and capacity for collaboration. Boredom can grow from a sense of isolation and disconnection from other members of the team. A common cause of boredom is a lack of understanding; for example, if a team member struggles to follow the discussion and make connections to their research they may become bored with the conversation. The opposite is also true. If something is too easily understood, to the point of being predictable, people are likely to become bored. Unfortunately, there are numerous examples of team members falling asleep, gazing into space, and working on unrelated tasks during team meetings.

Some team members demonstrated boredom more often than others, but everyone apparently had at least one bored moment during the project. Caveats include the fact that academics are often engaged in many projects and may simply be exhausted due to overcommitment and numerous responsibilities. However, academics are also professionally trained learners and they should be exceptionally motivated to learn from and identify connections with other scholars. Unfortunately, when they become bored, they resort to side conversations and sleeping during meetings. Some team members showed their boredom with such behaviors as: (a) intense staring out the window or at the agenda in front of them, (b) using one’s reflection in the window to clean his teeth with a toothpick, (c) grading papers or student assignments, (d) websurfing, and (e) preparing for their presentation instead of paying attention to the
current speaker. Sometimes the sleepy culprits would wake up during the middle of a team member’s presentation, quickly pack their belongings up, and leave the meeting in a frenzy. Behaviors demonstrating boredom posed a challenge to developing CCC, yet were such an honest reflection of team members’ current states, that they were useful in gauging the energy of the group.

**Jockeying for power.** Whereas debates of expertise could be innocent challenges used to better understand a scientific aspect of the team’s research, communicated power struggles were competitive, combative exchanges. Jockeying for power appeared to be ego driven, where one team member deliberately sought power over another team member. I believe that this team was especially susceptible to such struggles because of the leadership structure—five PIs is too many. As a participant-observer, I found myself in the middle of one excruciating example of two team members jockeying for power.

I had been working with the modeling subgroup on a regular basis, observing them while contributing to the model building; simultaneously, I was involved in preparing the workshops with the outreach subgroup. A PI, and member of the modeling subgroup, was determined that he should take the lead in recruiting workshop participants because of his extraordinary list of community contacts. Without directly discussing the workshops at the modeling meetings, we would work on pieces of the model that we believed would interest stakeholders. The modeling PI announced that he had been working on a master narrative to describe the local airshed. I did not think much of it until he elaborated:

> We need a “blue ribbon panel.” We need to get these folks to buy into our narrative . . . . So, now I’m really doing the work of [Outreach Subgroup Co-PI] and her crew.

He explained that he would write the narrative, the modeling subgroup would build a model to reflect it, and that they would present the model to the workshop participants.

Modeling Co-PI 2: (expressing some concern) We should look at the goals from the proposal . . . this may or may not be in alignment.

Modeling Co-PI 1: (persuasive tone) Well, of course, but this would be the consensus statement to get us started on those goals.

Modeling Co-PI 2: (hesitating) I’m not sure about that . . . we should check with [Outreach Subgroup Co-PI] before we continue along this path.

The first PI seemed agreeable, but continued to set deadlines for contacting his blue ribbon panel members and constructing his narrative. In the meantime, I knew that the blue ribbon panel and a master narrative were not in line with the goals of the outreach subgroup, but I did not know how to challenge this senior member of the research team. He eventually called a meeting, inviting the outreach subgroup. The meeting went smoothly and the modeling co-PI and outreach co-PI agreed to meet afterward to discuss the list of potential workshop attendees.

The next day the outreach PI called me; she was distraught: “[Co-PI] called me a lone wolf! I won’t work with him anymore . . . I won’t do another project if he is on
the team . . . he was vicious . . . downright nasty to me.” She went on to explain that this PI had lectured her on the difference between opinion and decision leaders, “he was citing twenty-year-old theories, as if I didn’t know the stuff.” She continued to recount the details from the meeting:

He wants the blue ribbon panel to be this speaker box, telling the people what to think . . . he asked me to sacrifice the integrity of my research to move his agenda forward . . . He explained that he had presumed that [a graduate student helping with workshops] was waiting for him to give her his contacts and he said that if he gave her all of his contacts that it would just be too overwhelming for her.

I followed-up with a third co-PI who attended the meeting and he confirmed the viciousness of the attack, including the lone wolf accusation. The modeling co-PI was jockeying for power over the outreach co-PI, and the outreach co-PI felt that she had been attacked in his struggle for power within the team. This power struggle destroyed any semblance of an interpersonal relationship between these two PIs. The two rarely spoke after that and the modeling co-PI was not included in any of the outreach workshops as initially planned.

In all of the examples from my field notes, jockeying for power appeared to have an intense impact on the team’s communication competence, often destroying relationships among members. Communicated power struggles seemed to be the result of one team member, possibly insecure with his or her own role in the project, finding ways to hijack the expertise of his or her teammates in order to gain power within the team. It is also possible that this particular power struggle was related to traditional gender roles and the role of gender in academia. Of course, it would take another focused investigation to explore how gender influenced the small group dynamics of this IDR team.

This case study was an exploration and an attempt to articulate the key processes that influence CCC in an interdisciplinary, academic IDR team. The development of CCC was directly influenced by spending time together, building trust, effective task talk, discussions of language differences, demonstrating participant presence, reflexive talk, backstage communication, and shared laughter. The successful development of CCC was challenged by the impact of conflict, which included debating expertise, negative humor, behaviors of boredom, and jockeying for power.

**Conclusion**

CCC in academic IDR teams is enhanced when the team members trust each other, demonstrate presence, use humor and challenging statements in a positive manner, and invite opportunities for backstage and reflexive talk. Shared learning and language use also enhanced CCC. Together these structures and processes influenced the team’s ability to communicate effectively to address the task and maintain social relationships among the team members. Unfortunately, other processes limited CCC. CCC appeared to be compromised when team members were sarcastic, displayed their boredom blatantly, and made judgmental comments intended to challenge the integrity and expertise of another teammate. In addition, communicated power
struggles challenged expertise and shut down opportunities for communication. In a few cases, these communicative processes destroyed relationships among team members. Combined, these elements help to understand the nuances of communication competence in academic research teams. My analysis also suggests that IDR teams may need to develop CCC to collaboratively address complex research questions. Ultimately, effective teams will develop effective communication patterns, just as effective communication patterns help teams to improve and develop rewarding working relationships. My findings suggest that once a team negotiates how to communicate, members can engage in collaborative problem solving. In this team, it appeared that CCC required regular maintenance; members did not enter the project with a preexisting set of communication norms.

**Limitations**

These observations and interpretations are based on one academic IDR team, and were analyzed by a sympathetic participant observer; meaning, they may not be generalized to a wider population. As with any singular case study and ethnographic investigation, there are limits in extrapolating findings. I would like to highlight three limitations of this study. First, while ethnographic investigations of interdisciplinary teams can enhance our understanding of communication processes in teams and small groups, such investigations are limited because conclusions are generated from one case study. Moreover, interdisciplinary teams in one university are different than teams that include members from multiple universities. Likewise, such a team is much different from an interorganizational team where members are included from multiple institutions (e.g., government agencies, private sector businesses, NGOs, nonprofits, and universities). The culture of academic institutions is very different from the culture of a business or government agency. Many of the constraints and challenges the team faced could be related to the expectations and organizational culture of academia.

A second limitation is the fact that there was only one coder—alone, as the author of my field notes and coder of my field notes, I was the only tool of analysis and interpretation. To counter this limitation, I frequently shared my interpretations with members of the research team and requested their feedback.

Finally, this study observed the first four years of the participants’ relationships with each other. At the time of writing this manuscript many of the participants’ were writing additional grants and submitting proposals for funding on many different projects. This study only analyzed the beginning of their relational development, and it is possible that as time goes on their relationships will continue to evolve. Despite such limitations, the conclusions from this study can be used to inform IDR practitioners, facilitators, and future studies of interdisciplinary communication.

**Directions for the Future**

I recognized many interesting facets of the group’s interaction that would be of interest for further investigation. First, it would be useful to assess whether the
conceptualization and variables of CCC presented here are evident in other case studies of bona fide teams. Second, it would be useful to investigate how other teams confronted similar challenges to CCC and promoted communication to better facilitate the development of CCC. A third area of interest is the exploration of how the role of the individual influences CCC development; perhaps certain types of individuals are more or less competent communicators and bring such skills to interdisciplinary team-based research.

Also I am led to ask how gender might influence CCC in interdisciplinary academic research teams. Gender in this team was invisible most of the time, but at a few interesting communication exchanges, a team member’s gender and stereotypical gender roles were made explicit. It would be interesting to investigate how academic researchers negotiate their gender and gender roles while communicating in IDR teams. In short, there are many nuances to collective communication competence in IDR teams, which deserve further exploration in future studies.

Practical Applications

The results of this analysis are intended to better understand interdisciplinary communication, and may prove most useful for interdisciplinary team managers and project coordinators. I outline four suggestions for team members and managers based on my findings: (1) build in trust-building time, (2) host explicit discussions about language differences, (3) schedule social time, and (4) confront communication challenges early.

First, interdisciplinary teams should write project proposals and team agendas to include time for building trust and engaging in reflexive talk. Time is one of the most sacred assets for any researcher, and team members may become frustrated if meeting time is not being optimized. However, I suggest that time be allotted for team members to recognize and discuss the need for trust and barriers to trust in their team. This time should also facilitate reflexive communication about the team’s relational evolution and development of CCC.

Second, team managers should make an effort to supplement talk about tasks with explicit discussions about language differences. Many of the challenges this team faced were related to jargon and terminology differences; such barriers can be reframed as learning opportunities for the entire team. Managers should be cognizant of concepts and terms that are not accessible to all members of the team, and make room during the meeting time to dissect, discuss, and learn from such differences. Third, teams might also consider scheduling social time for members to build relationships and share laughter. I recommend that large teams set aside time for members to network and mingle among themselves. Researchers may be much more motivated to participate in collaborative work if some type of social benefit accompanies the professional rewards for participating.

Finally, it appears that negative humor, debating expertise, communicating boredom, and power struggles are an inherent part of interdisciplinary team dynamics; efforts should be made to confront such challenges before nasty habits
become group norms. IDR teams could benefit from the use of a professional facilitator. A professional facilitator can help the team to manage negative aspects or the dark side of communication competence. Team members may not know how to confront such conflicts or challenges. Instead of avoiding collaborative research because of the possibility of unpleasant experiences, teams should include funding for a facilitator to help the team reflect upon and navigate through such challenges. CCC in interdisciplinary teams may develop faster with the assistance of a facilitator. Based on this study, it seems that investing time and resources into actively working to develop and maintain CCC benefits the team in the long run.

References


