

# Interactivity and Electronic Communication: An Experimental Study of Mediated Feedback

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## ABSTRACT

This paper describes an experimental study of interactivity effects in electronically mediated feedback communication. Conversational interactivity is expected to be lower when pairs of subjects are using mixed communication media. Performance feedback is expected to be less successful when interactivity is reduced, especially when the properties of the communication environment violate the norms of feedback communication. This paper describes work in progress: the experiment has been conducted and data are being analyzed.

## Categories and Subject Descriptors

H.5.3. [Group and Organization Interfaces]: Collaborative computing, Computer-supported cooperative work

## General Terms

Experimentation, Human Factors.

## Keywords

Interactivity, feedback, mediated communication, mixed-media, experimentation.

## 1. Introduction: Interactivity

The use of electronically-mediated communication like e-mail, instant messaging, or videoconferencing, has become commonplace in organizational life, and is especially important for supporting interactions among distributed colleagues. Given this reliance on new communication technologies, it is important to know if using these technologies changes the way that individuals interrelate. This paper presents an experimental study of interactivity effects in electronically mediated feedback communication.

A key concept in this study is “interactivity.” A communication medium affords interactivity if it allows for interlocked and contingent action, in the sense that Weick speaks of the process of organization:

Processes contain individual behaviors that are interlocked among two or more people. The behaviors of one person are contingent on the behaviors of another person(s), and these contingencies are called *interacts*. The unit of analysis in organizing is contingent response patterns, patterns in which an action by actor *A* evokes a specific response in actor *B* (so far this is an *interact*), which is then responded to by actor *A* (this complete sequence is a *double interact*). [14, p. 89]

While it is not necessary that there be rich and full communication to enact these contingencies [13], there must be some way for *A* and *B* to signal responses to each other. This study tests the hypothesis that various media impose different costs on this signaling, and that the choice of medium in which to interact will affect both organizational processes and outcomes.

The term “interactive” has been given a wide variety of meanings in reference to computers and communication, especially to designate interfaces that respond to human input (e.g. “interactive web sites,” or “large interactive displays”). I will use it in a more restrictive fashion (similar to [2]), to refer to a property of human communication that may be supported in varying degrees by a particular communication medium or environment.

## 2. Mixed-Media Communication

One assumption in much mediated communication research is that all actors in a conversation are using the same communication medium. Some work has studied the difference between one-way (monologue) and two-way (dialogue) communication [3], but there has been little attention paid to communications in which participants are using different media.

However, due to both the design of various communication technologies and the bricolage nature of end-user applications, mixed-media situations are not uncommon. For example, Centra Symposium electronic meeting software allows only one participant to be shown on video and heard in audio at a time [4]. If other participants wish to respond to someone who is speaking, they can only do so through text messages. Mixed-media conversations may also result from the variety of available computing and communication technologies. For example, many current-generation instant messaging (IM) systems support audio and video connections, but some participants may not have the required microphone or webcam. As a result, it is possible that only one person is visible and audible while the other is communicating through text messages.

The present study focuses on situations in which the communication partners are using different media. The aim is to understand how mixed-media environments affect the content and quality of conversations. Additionally, mixed media situations provide an opportunity to investigate the interaction of media affordances with conversational roles and norms.

## 3. Communicating Feedback

Feedback communication presents a particularly good test case for examining media affordances. Receiving feedback from supervisors and colleagues plays an important role in organizational life [1]. Successful feedback communication depends on a number of variables, including whether the feedback

is positive or negative, how skillfully the feedback is communicated, and whether the message is consistent with the recipient's expectations and self-image. Beyond these characteristics of the feedback message, several relational factors contribute to success, including interpersonal trust, shared social identity, and perceived power differentials [9].

Many of the same factors that determine feedback success have been shown to be affected by working in distributed environments or through electronically mediated channels [12]. For example, feedback delivered electronically tends to be more negative [7], trust tends to be more difficult to establish [10], conflict can be more destructive [8], and there is a higher likelihood of misattribution of intent [6].

Additionally, feedback conversations tend to have clearly defined roles and norms. Most feedback conversations have a distinction between the person giving feedback and the person receiving feedback. There are also culture-specific expectations, especially around how to deliver negative feedback [11]. These conventions suggest that there are norms which might deviate in consistent and observable ways under different media conditions if the media impact feedback delivery.

#### 4. Interactivity and Electronically Mediated Communication

There are three primary ways that media may impact interactivity. First, signaling may incur different costs in different media. For example, typing a response may require more effort than saying it. Second, the media may limit the ability of both partners to participate equally in the communication. Can both signal their responses, and are the signals sent in the same way? Finally, various media may impact the speed with which the signals can be sent and received. E-mail can have long delays between responses while instant messaging provides the ability to have quicker exchanges.

Supporting interactivity is particularly difficult in mixed-media environments. Some media may incur higher participation costs or different message speeds (e.g., it requires more effort and is slower to type than to talk). Or one participant may have a richer medium than another. When these media characteristics are unbalanced among participants, it will be difficult to have an interactive conversation. For example, by the time a person using text chat is able to type a reply to a comment made in an audio channel, the speaker may have already moved on to a different topic. These kinds of imbalances will tend to reduce interactivity.

Interactivity plays an important role in helping participants in a conversation create shared meaning. For each contribution to a conversation, grounding requires that the participants mutually believe that they understand what the contributor meant [5]. Reduced interactivity in a conversation will make it more difficult for the participants to meet this grounding criterion. It will make it more difficult for the listener to give signals that she understands, or ask for clarification when she does not.

Even when both the feedback provider and recipient understand the meaning of each individual utterance, reduced interactivity can still present challenges to higher-level comprehension in the conversation. The lack of interactivity makes it more difficult for the feedback recipient to ask questions or challenge the provider on the feedback that is given.

#### 5. Method

An experimental study was conducted to investigate these issues. Subjects were recruited from a subject pool at a large Midwestern university. Thirty-seven same-gender pairs of subjects (19 male, 18 female) completed the experiment. Subjects were on average 24 years old. 40% of the subjects reported having an undergraduate or graduate degree. All subjects were required to have English as their first language and to have lived in the United States for at least three years. Subjects were also required to be regular users of e-mail, Internet and Instant Messaging systems, and to have recently used Microsoft PowerPoint.

Pairs of subjects worked together in a simulated business task. Subjects were given a business case study about employee conflict. Subjects were told that they were acting as consultants to the company in the case. Their task was to create a PowerPoint presentation for the employee's manager recommending a solution to the problem in the case study.

Working alone, one subject (the "writer") was given twenty-five minutes to create the PowerPoint presentation. After the writer finished, the presentation was delivered to the second subject (the "critic"), who had ten minutes to study it. The critic then was instructed to give feedback to the writer about how to make the presentation better.

		Feedback Provider (Critic)	
		IM	Video + Audio
Feedback Recipient (Writer)	IM	Condition 1	Condition 2
	Video + Audio	Condition 3	Condition 4

Table 1: Experimental Conditions

Feedback was communicated in an electronically mediated 2-way conversation (dialogue). This experiment uses a 2x2 ANOVA design (see Table 1). Depending on the experimental condition, the critic delivered feedback in video conferencing (video + audio) or by instant messaging (IM). The writer was able to respond, but not necessarily in the same medium. Thus, it is possible that the critic gave feedback in IM while watching and hearing the writer through video conferencing.

After the two subjects discussed the Presentation for ten minutes, the writer was given an opportunity to update the PowerPoint presentation based on the feedback received.

Measures of communication success come from a number of sources. Questionnaires administered after the feedback session provided data about the subjects' perceived relationship and their opinions of each other and the task.

Transcripts of the feedback conversation are being coded for content, tone, style, level of participation, and interactivity. The coding categories were initially developed based on the theoretical framework outlined above. Content is coded at the level of "items of feedback." Each item of feedback is then coded on several dimensions, including whether the feedback is positive or negative, whether the item is discussed, and whether the subjects reach agreement. The coding scheme was refined

iteratively using transcripts from pilot sessions to clarify the coding categories and develop high inter-rater reliability. Coding for the transcripts from the actual study is now in progress.

Finally, the completed PowerPoint presentation will be analyzed to determine whether the Writer accepted and utilized the feedback provided to them.

Coding and data analysis are in process, and preliminary results will be available to present at GSRs 2006.

## 6. Discussion

This experiment will provide data to test a set of hypotheses about interactivity, electronically mediated communication, and feedback delivery.

Same-medium conditions (Conditions 1 and 4 in Table 1) are expected to afford greater interactivity than mixed-media conditions (Conditions 2 and 3 in Table 1). When participants are using different communication media, they will find it more difficult to have an interactive conversation. The subject using video-conferencing will be able to communicate faster and with less effort. The subject using instant messaging may not be able to keep up with the flow of conversation. Also, because video-conferencing and instant messaging tend to have different genre conventions (e.g. turn taking, how to signal emotion, etc.), it will be more difficult for participants to manage the communication process in a mixed-media conversation. The media imbalance will prevent equal participation and interfere with the process of enacting contingencies and interdependencies in communication.

Feedback communication is expected to be less successful when interactivity is diminished (Conditions 2 and 3). Through interaction, participants establish common ground and develop a sense of mutuality. Communicators manage the tone and style of conversation by monitoring the reaction their statements elicit. These processes are essential for successful feedback communication.

Finally, I expect that feedback communication will be less successful in Condition 3 than in Condition 2. In Condition 2, even though the media are not balanced and I expect interactivity to be diminished, the imbalance fits the expected power dynamic in a feedback conversation. That is, the person giving feedback is able to control the content and tone of the conversation because she is communicating with less effort and in a richer medium than the person receiving feedback. In Condition 3, the characteristics of the communication environment violate the roles and norms of feedback conversation.

## 7. Contribution

This research will make two important contributions to our understanding of electronically mediated communication.

First, it will add to our knowledge about communication in unbalanced media conditions. Media imbalance may be an important factor in understanding the success of electronically mediated communication. Designers of communication systems may want to be wary of creating systems that provide different communication capabilities to different participants. Future research could investigate effective strategies for communicating in non-uniform media environments.

Second, this research investigates the claim that communication success is determined by an interaction of the properties of the

medium and the norms of a particular type of communication. Thus, unbalanced media environments (and the resulting diminished interactivity) may be less detrimental to feedback communication if the media imbalance matches the genre's inherent power dynamic.

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