

Running Head: Video Delay Effects

Video Delay Effects on Emotions, Involvement, and Communication Outcomes

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Abstract

This paper reports the second experiment in a series investigating the effects of video delay on emotions and communication outcomes. Drawing on theory about the effects of temporal coordination, we hypothesized that even a small delay in visual and auditory feedback through a video communication system could produce changes in emotion and communication outcomes, and that this effect is moderated by an individual's level of involvement while performing the task. Our operationalization of involvement accounted for situational, enduring, rational, and affective types of involvement. We also explored the effect of one, two, and four second delays on the outcome variables. Results showed that, when discussing political topics, highly involved individuals experienced significantly less communication satisfaction and positive emotion in the delay condition, and that this effect was stronger with longer delays. Lowly involved individuals were generally less affected by the delay, although they did report increased negative emotion. Implications for this construction of involvement are discussed.

Introduction

This paper reports in the second experiment of a series investigating the effects of video delay on emotions and communication outcomes. Drawing on theory about the effects of temporal coordination, we hypothesized that even a small delay in visual and auditory feedback through a video communication system could produce changes in emotion and communication outcomes, and that this effect is moderated by an individual's level of involvement while performing the task.

Temporal Coordination and Disruption

Ever since film was able to capture and isolate the ways in which people's movements influence each other when conversing—whether it be posture, gesture, rhythm, or mimicry—we have learned a great deal about how subtle changes in nonverbal interpersonal interaction timing can affect emotions and communication outcomes. From birth, an individual engages in an entrainment process with its primary caregiver, such that movements can reinforce, punish, or model emotional responses. This process is so important that it is thought to form the basis of socialized communication responses (Tronick, Als, & Brazelton, 1977) and ultimately language. Nonverbal acts such as head nodding, leaning forward or backward, eye gaze, and smiling can facilitate conversation if they are timed properly, or they can send “mixed signals” to the receiver if they are timed awkwardly, potentially resulting in hurt feelings or misunderstandings.

Many researchers have made the distinction between behavior matching and interactional synchrony, although both fall under the heading of interpersonal coordination (Bernieri & Rosenthal, 1991), and may simply represent two ends of the spectrum. In this

paper, we refer to interpersonal coordination as a family of concepts that includes entrainment, posture sharing, conversational rhythm, mimicry, and synchrony. We refer to coordination and synchrony to address varying degrees of the same phenomenon.

All of these concepts have the idea of temporality at the core. Initial research by Condon and his associates found that intrapersonal synchrony occurred on the sub-second level. On the other hand, we may be quite accustomed to a lack of synchrony with others, and that is why it is particularly gratifying when we achieve it (Chapple, 1970). As Gatewood and Rosenwein (1981) point out, there are two views of the mechanism of synchrony. Condon's (1966, 1967, 1971) work suggested a kind of rhythmic entrainment that enmeshed the physiological rhythms of interaction partners. Kendon (1970), however, thought of synchrony as more like an intermittent tracking process that increased according to how much a conversational partner was paying attention.

In the field of cybernetics, the study of synchrony in motor coordination has yielded important findings regarding the nature of both intrapersonal and interpersonal physiological linkage. Cybernetics experiments usually explore how disruptions in feedback disrupt control and affect coordination of physiological systems (such as hand-eye coordination) (Smith & Smith, 1987) or the workflow between two or more people, such as the coordinated task of using joysticks to move video game pieces through a maze (Henning, Boucsein & Gil, 2001). Synchrony occurs through a hierarchy of feedback and feedforward processes (Smith & Smith, 1987), and these processes may be tightly or loosely coupled with related systems, such as those devoted to attention. Therefore, interactional synchrony may take the form of intermittent tracking and coordination or highly enmeshed physiological rhythms.

Communication technology adds an additional layer of analysis to the interaction environment. Nonverbal communication can be distorted, replaced, or eliminated by various communication channels (Short, Williams and Christie, 1976). Argyle and Dean's (1965) equilibrium theory proposes that if individuals have established a baseline of intimacy in interaction, they will adjust their behavior to compensate for changes in the setting (such as the inverse relationship between proximity and eye gaze). Parkinson and Lea (in preparation), in their experiment on video communication, argued that it is not accurate to compare video-based communication to face-to-face communication, because one does not attend to one's partner in the same way. Only part of the body is visible, attention is focused on the face, and often eye gaze is not direct, due to camera and screen locations. Therefore, the lack of synchrony in a video-mediated conversation may not be so important to the task at hand if one is able to compensate for it. However, we posit that the choice of task may result in different communication outcomes, depending on the presence of moderating variables. One probable candidate for moderator of the effects of synchrony or the disruption of synchrony by delay is involvement, which will be discussed in the next section.

Involvement

Kendon (1970), in his pioneering studies of interpersonal synchrony, felt that the function of interpersonal coordination was to signal attention. Communication scholars have also proposed that motor mimicry serves a primarily communicative function (Bavelas, Black, Chovil, Lemery & Mullet, 1988). The motivation for attention, however, can be traced back to two distinct types of involvement: how involved someone is in the topic (message involvement), and how involved someone is with the conversation partner (communication involvement). Additionally, there are both rational and affective components to a sense of

involvement (Petty, Cacioppo, & Schumann, 1983; Buck et al., 2004). Any of these dimensions of involvement may moderate the impact of a delay on communication outcomes. For example, someone who is involved in the topic may become frustrated if the delay causes small changes in his or her partner's nonverbal timing which result in the appearance of a lack of attentiveness. Similarly, someone who is involved in the act of communicating with this particular partner may experience the same effect.

It is well established in the consumer research and political communication literature that involvement is one of the key variables in the way that people process information. We define involvement as the depth or amount of cognitive response to a message or object (Greenwald & Leavitt, 1984; Batra & Ray, 1988; Buck et al., 2004). Following Buck et al. (2004) we define cognition broadly to encompass both rational cognition and emotional cognition. In this case, involvement is defined as the depth or amount of both cognitive and affective responses to an object, respectively *rational involvement* and *affective involvement*. There is disagreement as to whether and how these two components of involvement interact. Some authors have suggested that they act together (Batra & Ray, 1988; Andrews, Dursuvula & Athker, 1990) and others that they work independently (Buck et al., 2004). Buck et al. (2004) suggests that rational involvement and affective involvement act additively together to form a measure of a general involvement.

There is a major temporal distinction between two types of involvement. There is much agreement to the separate conceptualization of *enduring involvement*, a long-term enduring state, and *situational involvement*, a short-term localized state (Celsi & Olson, 1988, Richins & Bloch, 1992). Usually, enduring involvement is attributed to individual difference variables representing a general long-run disposition or trait of concern towards certain objects, concepts or messages that a person brings into the process. On the other hand, situational

involvement is a “temporary feeling linked to a specific association” (Richins & Bloch, 1992, p. 143) usually attributed to a physical or social context. At a certain point in time, existing levels of enduring involvement combine with situational involvement to produce an involvement response. Previous research has shown that enduring involvement and situational involvement, like rational and emotional involvement, interact in an additive way (Richins & Bloch, 1992).

Political Involvement. The topics selected for discussion in the experiment were the 2004 United States presidential election and the United States involvement in the war in Iraq. Because of the highly political nature of the topics the enduring involvement that is most likely to come into play when discussing them is political involvement. In a political communication context, enduring involvement has been termed political involvement and defined as the interest in politics (Faber, Tims, & Schmitt, 1993; Sundar et al., 2003), motivation to understand politics in terms of issues and ideologies (Evans, Heath & Lalljee, 1996), and perceptions of an issue’s personal relevance (Pinkleton & Austin, 2001). In the current research, political involvement can be understood as the amount of involvement that a person brings with her to the interaction and that will add up to the message and communication involvement, which are byproducts of the interaction itself. The logic is simple: people who are generally more involved with politics will tend to have a more involved discussion about politics.

Emotion

In addition to signaling attention and involvement, interpersonal coordination has often been written about as one of the correlates of rapport (Bernieri & Rosenthal, 1991; LaFrance, 1979; Tickle-Degnen & Rosenthal, 1990), along with mutual attention and

positivity. People have positive feelings when they are involved and “in sync” with their conversation partners, particularly if they are having a positively valenced conversation. Dissynchrony, in contrast, is consistently associated with negative emotions. Hatfield et. al (1992) suggested that it may be disruptive to social exchanges, and foster miscommunication and conflict. Without coordination, we may feel mildly stressed or unpleasant.

Effects of Video Feedback Delay

With these perspectives on coordination and involvement in mind, we designed a series of experiments to test how a delay in video-mediated visual and auditory feedback would affect emotion and communication outcomes. In our previous experiment (Rauh & Renfro, 2004) we found that a one-second delay had only a small effect on reducing social attraction. The one-second delay also made people report slightly higher levels of outgoing feelings, which we argued could have occurred in order to compensate for the disruption created by the delay. Additionally, we did not achieve significant results on our measure of involvement and several of our interpersonal emotion factors (Uncomfortable, Aroused, Frustrated and Defensive). We found that participants, in general, could not perceive a one-second feedback delay, which suited our purposes of manipulating temporal synchrony without drawing attention to the manipulation. Based on the results of the previous study and the discussion above we hypothesize that:

H1: Delay is inversely related to (a) communication satisfaction, (b) social attraction, and (c) positive emotions.

H2: Delay is directly related to negative emotions.

Delay Awareness. In our previous experiment, we found that participants were not significantly aware of a one-second video feedback delay. We repeated our use of a one-second delay, in the current experiment but added additional dyads with two and four second delays. These two larger amounts of delay were chosen to explore when the delay became significantly perceptible and to determine the optimum level that would demonstrate a change in communication outcomes without creating a situation so difficult that participants were unable to carry out their conversation task. To clarify this issue, we will test the following hypothesis and research questions:

H3: A one-second delay will not be perceptible.

H4: A four-second delay will be perceptible.

RQ1: Is a two-second delay perceptible?

RQ2: Is the amount of delay directly related to the delay effects on emotions and communication outcomes?

Delay and Involvement. Numerous experiments have established that people arrive at different conclusions depending on their degree of involvement (Petty, Cacioppo, & Schumann, 1983; Celsi & Olson, 1988; Richins & Bloch, 1992; Faber, Tims, & Schmitt, 1993). In general, the more involved people are then the more probable it is that they will engage in thoughtful and deliberate reasoning. On the other hand, lowly involved people will use automatic intuitive processing based on affect and heuristics (Petty, Cacioppo, & Schumann, 1983; and see Kahneman, 2003 for a discussion). However, most of the research done in involvement has not considered coordination or synchrony of the process. More specifically, although involvement has been shown to moderate many persuasion processes,

the question of the effects of involvement as a possible moderator of delay effects has not been investigated.

From a cybernetics perspective, relationship between synchrony, involvement, and positivity, is dynamic, and a change in the level of one variable will cause the interplay between variables to become more tightly or loosely coupled. In particular, because involvement is related to mutual attention, we argue that a higher involvement leads to greater coupling. Thus, because involvement works to maintain the coupling of the system, disturbances in coordination and synchrony by the introduction of a delay would be moderated by it. Based on this assumption, in the current experiment we chose to examine the effect of the delay on changes in communication outcomes, as moderated by involvement. So that, when people are more highly involved, they are in a more synchronous state and the delay will have more of an impact on their communication satisfaction and social attraction, which, for these purposes, are seen representing an underlying construct similar to rapport.

Based on previous research we pose the following research question:

RQ3: Does Involvement moderate the effects of delay on emotional responses and communication outcomes?

In the previous experiment, we had asked participants to discuss the light-hearted topics of reality TV and a trip around the world, which did not seem to provide an interaction goal that stimulated enough involvement. In this experiment we chose more emotion-eliciting topics (the United States involvement in the war in Iraq and the United States 2004 presidential elections), with the hope that participants would be motivated to have a more involved conversation. We added a more comprehensive measure of

involvement that took into account several aspects of a person's experience as well as temporal distinctions.

Method

A basic random within subjects experiment was conducted with amount of feedback delay as the one factor. Feedback delay was manipulated at three levels: 1, 2 and 4 seconds. Participants interacted through video monitors in both the control condition where no delay was present or in the delay condition where a delay was introduced in their signal. A different topic was discussed during each interaction. A full balanced design was employed in the order of the within-subjects conditions, the topics, and emotion questionnaires (discussed below) to control for order effects.

Participants

A total of 98 participants were recruited from introductory communication courses from a large northeastern public American university and took part in the experiment for extra class credit. Of those, 66 were females and 32 were males. Participants were paired into dyads and randomly assigned to each of the conditions. However, due to technical problems and time constraints, the conditions were not equalized – 70 participants were assigned to the 1-second delay condition, 14 participants to the 2-second delay and 14 participants to the 4-second delay.

Stimulus Materials

Video Monitor Setup. Participants interact through a video monitor system. Two rooms were equipped with video cameras and large TVs. Signal from each camera would run

through a delay unit and to the other room's TV. The cameras were setup on top of the TV to allow the participants to see each other while looking at the screen. While all effort was made reduce parallax effect, participants did not have perfect gaze contact. In the open questions asked about the experiment, a few participants commented about this effect. Any parallax effect is controlled for since the setup is fixed and consistent. However, because gaze is an important conveyor of nonverbal information, it is still possible that the camera setup could have influenced the communication between the participants in a homogeneous way.

Topics. Participants were asked to discuss 2 politically charged topics, the 2004 United States presidential election and the United States involvement in the war in Iraq. Participants were given a topic sheet with the topic title and a list of 6-7 questions and items to guide the discussion. The topics were chosen so that they would induce politically and emotionally charged discussion for the whole interaction period (10 minutes). Topics were balanced to control for topic order effects. Questions for the presidential election topic included “How do you feel about the particular candidates?”, “How do these feelings differ from those of your friends and family?”, “What would you say to someone who disagrees with your opinions?”. Questions for the war in Iraq topic included “What do you feel should be done now?”, “What is your opinion of news media coverage of the war?”, “What unanswered questions do you have?”. Topics were balanced to control for order effects.

Delay Manipulation

We manipulated delay in a 2x3 design with *delay level* as a between subjects manipulation and *delay presence* as a within-subjects manipulation. Delay amount levels for between subject conditions were 1, 2, and 4-second delay. Delay presence levels for the within-subjects

conditions were the presence of delay (as defined by delay amount) or no delay for the control condition. The delay was manipulated through the delay unit and a bypass switch. Within-subjects manipulation was done by setting up the delay unit for the amount defined by the between subjects condition and bypassing the delay unit for the control condition. Each dyad interacted with no delay and with one of the delay conditions. Because configuration of the delay unit took several minutes, the delay unit was configured once at the start of each day of data collection to one of the between subjects delay conditions and only the switch was used to switch between within-subjects conditions. Delay conditions were balanced to control for order effects.

Measures

Before the interaction, we measured participants' political involvement and basic demographic information. After each topic discussion, we asked participants to report their emotions during the interaction, their communication satisfaction, social attraction, communication involvement, and topic involvement. Therefore, for each participant we had two measurements of these variables, one for the control condition and the other for the delay condition. Finally, participants reported their perceived delay of the system at the end of the session. The measurement scales used are reported next:

Involvement. Participants were categorized into high and low involvement based on the sum of their enduring and situational involvement in the control condition. As discussed above, enduring involvement was operationalized as political involvement. Situational involvement was operationalized as the sum of topic involvement and communication involvement. The scales used to measure political involvement, topic involvement, and communication involvement, are described below. After the three involvement scales were

summed, we coded the variable into high and low involvement by splitting the group in the 50 percentile.

Political Involvement. This variable was assessed with a composite scale based on the affective and rational items from the ARI scale (Buck, Chaudhuri & Ray, 2004) and communication/behavioral items modified from a different political involvement scales (Faber, Tims, & Schmitt, 1993; Evans, Heath & Lalljee, 1996; Pinkleton & Austin, 2001). The final scale used was a 10-item 7-point Likert type. Confirmatory factor analysis was performed in the scale and all items loaded together with factor loadings higher than .63. Alpha reliability of the scale was $\alpha=.95$. The three highest loading items were “I do a lot of thinking about politics” (.90), “I have strong feelings about politics” (.90) and “I actively seek out political information” (.87).

Topic Involvement. This variable was assessed with an adaptation of the items from the ARI scale (Buck, Chaudhuri & Ray, 2004) to each topic. Confirmatory factor analysis was performed on the rational and affective dimensions. Results of the analysis elicited only one factor and 3 items had to be dropped because they did not load properly. The final reliability for the factor was $\alpha=.92$ and the items included were “I do a lot of thinking about <topic>”, “I keep up with the news about the <topic>” and “I have strong feelings about the <topic>”, where <topic> was either “presidential election” or “war in Iraq”.

Communication Involvement. This variable was assessed using a 4-item subset of the immediacy dimension of the scale reported in Burgoon and Hale (1987). The scale used a 7-point Likert type measure and the alpha reliability was $\alpha=.87$. The items used were “I found the interaction stimulating”, “I was intensively involved in our interaction”, “I wanted to get to know my interaction partner” and “I was interested in talking to my partner”.

Emotions. These variables were measured with a 32-item Likert type scale composed of 32 emotions. Participants rated how much they felt each emotion on a 7-point scale with 1 being ‘not at all’ and 7 being ‘very much’. We conducted an exploratory factor analysis on the items and obtained an eight-factor structure where all items had primary factor loadings higher than .61. The factor names, items included and their Cronbach’s alphas are *outgoing* (happy, friendly, talkative, pleased, open, sociable, cheerful; $\alpha=.88$), *stimulated* (stimulated, interested, $\alpha=.76$), *attracted* (turned on, attracted; $\alpha=.81$), *uncomfortable* (self-conscious, embarrassed, uncomfortable, nervous; $\alpha=.87$), *cautious* (careful, cautious; $\alpha=.92$), *down* (down, sad, depressed; $\alpha=.80$), *frustrated* (frustrated, irritated; $\alpha=.89$), and *angry* (angry, annoyed; $\alpha=.76$).

Communication Satisfaction. This variable was assessed using a 9-item subset of the Conversational Effectiveness Scale (Canary & Spitzberg, 1987). The scale is 7-point Likert type and alpha reliability was $\alpha=.85$. Items included “I was very satisfied with the interaction”, “the other person genuinely wanted to know me” and “the other person expressed a lot of interest in what I had to say”. *Social Attraction.* This variable was assessed using a 6-item subset of the social attraction dimension of the Interpersonal Attraction Scale (IAS) (McCroskey & McCain, 1974). The scale used a 7-point Likert type measure. One item was dropped and the alpha reliability was $\alpha=.86$. Items included “I think he/she could be a friend of mine” and “I would like to meet this person”.

Perceived Delay. We measured the perceived delay of the system through a 4-item 7-point Likert-type system synchrony scale (Rauh & Renfro, 2004). Alpha reliabilities were $\alpha=.75$. One of the items was dropped and alpha reliability was $\alpha=.75$. Items were “The video system was responsive to my actions”, “There was no delay in the system” and “The

interaction was not disturbed by the video system”. The scale was reversed so that higher values indicated more perceived delay. Perceived delay was only measured after the two interactions to avoid making the delay salient due to measurement reactivity. In addition, we explicitly asked the participants to indicate their feelings about the video system “during your second interaction”.

Results

Perception of Delay

Hypothesis H3, H4 and research question RQ1 concerned the perception of the delay manipulation by the participants. To test the hypothesis and explore the research question we conducted a series of t-tests on perceived delay for each of the delay conditions. Because perceived delay was measured only at the end of the session, the comparison groups for the t-tests are the participants who had the control condition last versus the ones who had the delay condition last. A t-test with only the participants at the 1 second delay condition supported H1 ($t(67)=-1.52, p=.13$). Participants did not perceive more delay in the 1 second delay condition ($M=4.56, SD=1.73$) compared to the control ($M=3.90, SD=1.96$). Another t-test now with the participants at the 2 second delay did not supported ($t(12)=-.38, p=.71$). Again, participants did not perceive more delay in the 4 second condition ($M=5.16, SD=2.21$) compared to the control ($M=4.65, SD=1.91$). Finally, for RQ1, a t-test using the participants at the 2 second condition indicated that participants also did not perceive a difference between the delay ($M=2.89; SD=1.53$) and control conditions ($M=3.05, SD=1.46; t(11)=.19, p=.85$). Overall, the participants did not perceive the delay manipulation.

An inspection of the means show that the perceived delay means for 1 second ($M=4.24$, $SD=1.81$) and 4 second ($M=4.92$, $SD=1.97$) were similar but the means for the 2 second are much lower ($M=2.97$, $SD=1.43$). A post-hoc ANOVA on perceived delay with delay amount as the only factor was statistically significant ($F(2,93)=26.99$, $p=.02$), and a Scheffe post-hoc test indicated that only delay amounts 2 and 4 are different ($p=.02$).

Delay Effects

To address the hypothesis H1, H2 and research question RQ3, we ran a series of repeated-measures analysis using a general linear model procedure with each of our dependent variables as the within-subjects factor and involvement and delay condition as between-subjects factors. First, we ran analysis for the communication outcomes variables: communication satisfaction, social attraction and communication involvement.

For communication satisfaction the three-way interaction between delay presence, delay amount and involvement was statistically significant ($F(2,83)=16.26$, $p<.001$, $\eta^2=.29$). For high involvement participants, delay presence decreased communication satisfaction at all delay levels. On the other hand, for low involvement participants, delay presence did not affect communication satisfaction levels, except for the delay level of 4 seconds when communication satisfaction was reduced. This result partially supports H1a and for RQ3, it shows that involvement moderates the effects of delay on communication satisfaction.

For social attraction the a two-way interaction between delay presence and delay amount was statistically significant ($F(2,89)=5.89$, $p<.01$, $\eta^2=.12$). This result partially supports H1b. Social attraction decreased only for a delay of 4 seconds. At 1 and 2 second delay, social attraction did not change.

For communication involvement, the three-way interaction between delay presence, delay amount and involvement was statistically significant ($F(2,89)=4.33$, $p=.02$, $\eta^2=.09$). Similar to communication satisfaction, high involvement participants had their communication involvement ratings lowered with the introduction of the delay at all levels. Low involvement participants had lower communication involvement ratings when the delay amount was 4 seconds, but no change at lower levels. This result partially supports H1c and for RQ3, it shows that involvement moderates the effects of delay on communication involvement.

Next, we will report the results for the analysis of the emotions as dependent variables. For *stimulated*, only the main effect for delay presence was significant ($F(1,90)=9.69$, $p<.01$, $\eta^2=.09$). Participants felt less stimulated when there was a delay in the video system. However, although the interaction effect between delay presence and delay level was not statistically significant ($F(1,90)=9.69$, $p<.01$, $\eta^2=.09$), inspection of the means indicated that there was little change in the 1-second delay condition. A post-hoc GLM analysis with the delay levels coded as low (-1) for the 1 second delay and high (+1) for the 2 and 4 second delay, revealed an statistically significant interaction between delay presence and high and low delay level ($F(1,92)=4.56$, $p=.04$, $\eta^2=.05$). Participants reported feeling less stimulated only with 2 and 4 seconds of delay, no difference was reported with 1 second.

For *outgoing*, the analysis revealed a statistically significant three-way interaction between delay presence, delay level and involvement ($F(2,90)=4.36$, $p=.02$, $\eta^2=.09$). High involvement participants reported feeling less outgoing when there was a delay in the system compared to no delay at all delay levels, although the difference is larger as the delay level increases. For low involvement participants, they reported feeling less outgoing with the delay compared to no delay only when the delay level was 4 seconds. At the lower delay

levels, the participants reported no change. The two-way interaction between delay presence and delay levels ($F(1,90)=14.10, p<.001, \eta^2=.24$) is noteworthy because it is stronger than the three-way interaction. Participants reported little change in how they felt outgoing compared to a control in the 1 and 2 second delay levels. However, there was a sharp difference in outgoing ratings at the 4-second level. Although it is not advisable to analyze two-way interactions in the presence of three-way interactions, if we consider both interaction effects, it is possible to argue that for the high involvement participants, although their ratings get lower at all delay levels, the differences are stronger for the 4-second delay.

For *attracted*, the analysis produced a statistically significant two-way interaction between delay presence and involvement ($F(1,90)=5.04, p=.03, \eta^2=.05$). Low involvement participants did not report any difference in how attracted they felt between the delay and no delay conditions. High involvement participants, on the other hand, reported feeling less attracted in the delay condition compared to the control condition when there was no delay. The above results partially support H1c and clarify RQ3. It seems that involvement moderates the effect of delay presence on positive emotions. Generally, high involvement participants reported less positive emotions when a delay was present. Low involvement participants vary in how they respond to the delay. Our results suggest that they do not seem to feel the effects of delay except in some cases for higher levels (2 or 4 seconds). The analysis for *uncomfortable*, *cautious* and *down* did not produce any statistically significant change. Participants did not report change in how uncomfortable, cautious or down they felt when a delay was present compared to the no delay control condition.

However, there were statistically significant interaction terms in the analysis of *frustrated* and *angry*. For *frustrated*, the three-way interaction between delay presence, delay level and

involvement was statistically significant ($F(2,90)=9.87, p<.001, \eta^2=.18$). High involvement participants reported small increases in their levels of frustration for the 1 and 4 second delay levels. Low involvement participants, however, reported no change in their frustration levels at the 1 and 2 second delay levels, but a large difference for the 4-second delay. The two-interactions between delay presence with delay level ($F(1,90)=14.90, p<.001, \eta^2=.25$) and delay presence with involvement ($F(1,90)=8.27, p<.01, \eta^2=.08$) were statistically significant. The first of the two-way interactions indicates that there is little or no difference in ratings of frustration for the 1 and 2 second delays, but a large increase at the 4-second delay. The second two-way interaction indicates that high involvement participants had a very small change in their levels of frustration and that low involvement participants had a larger change. The effect sizes for the two-way interaction allow us to gauge the contribution of each of these effects to the three-way interaction described before.

The results for *angry* are very similar to *frustrated*. The three-way interaction between delay presence, delay level and involvement was statistically significant ($F(2,90)=15.37, p<.001, \eta^2=.26$). High involvement participants did not report differences in their levels of anger. On the other hand, low involvement participants reported increased levels of anger but only at the 4-second delay level. At the 1 and 2 second delay levels, low involvement participants did not report any change in frustration levels.

The above results partially support H2. Delay is directly related to increases in negative emotions but only for low involvement participants at a 4-second delay level. For all other cases, negative emotions were not increased by delay presence at any level. Again, involvement moderates the effects of delay on negative emotions. Research question RQ3 asked whether involvement moderates the effects of delay. Our results, when taken together, indicate that involvement is an important moderator to these effects.

Discussion

The results provide compelling evidence for the importance of involvement as a moderating variable in the impact of feedback delay on emotion and communication outcomes. Participants with a high level of involvement experienced less communication satisfaction, communication involvement, and positive emotions in the delay condition, and this effect was stronger in higher delay conditions. Participants with a low level of involvement experienced more negative emotions in the delay, but overall they were less affected by it—only experiencing some effects when the delay was increased to four seconds. Overall, participants were not aware of the delay, although results for higher levels of the delay were inconsistent, as we will discuss next.

Based on observation during the data collection process, post-hoc review of the open-ended questions and comments from the participants after the 4-second delay, we are confident that the 4 second delay was perceivable. The lack of difference in the delay perception measures for the 4-second delay in particular can be attributed to measurement problems and are not generalizable. Delay perception was measured only after the second topic discussion and it is possible that participants, although instructed, were not able to separate their delay impressions from the first and second topic. In addition, the perceived delay means for each delay amount condition did not follow the expected pattern and that can indicate that the measurement instrument did not capture what we expected.

The pattern of response to the delay moderated by involvement that was found lends support to a social cybernetic interpretation of the relationship between involvement and communication and emotion outcomes. When the level of involvement is higher, it causes the delay to have a stronger effect on the outcome variables. At the lower level of

involvement, the manipulation has less of an effect. Therefore we see that the system becomes more tightly coupled as involvement increases.

Additionally, our operationalization of the construct of involvement allow us to hypothesize why the results from the first study were not replicated. By accounting for enduring and situational involvement, as well as rational and affective involvement, we draw importance to the contextual aspects of the experiment. It is not simply about the effect of a delay: it is also about one's pre-existing feelings about the topics, and the quality of one's conversation. We may assume that the charged political topics in this experiment created quite a different experience of involvement than the light-hearted topics of the last experiment. Participants were randomly selected, and so many conversation dyads represented opposing political views.

Experiment results might be quite different if participants were already acquainted. Research has indicated that people become more coordinated with greater acquaintance (Tickle-Degnen & Rosenthal, 1990), and so the delay may have more of an effect in those cases. However, Parkinson and Lea (in preparation) found that when acquaintances performed a conversation task over a web camera system, a small delay did not have a significant effect, although the same task with strangers had produced significant effects. So, depending on the task, the partner, and the medium, the ability to compensate or be distracted by the delay might change. The study of a variety of tasks among acquaintances would be a valuable extension of this research.

Conclusion

This research has extended our understanding of the phenomenon of interpersonal synchrony and its components. A cybernetics perspective brings the concept of coupling,

which helps us to understand the moderating effect of involvement. We conclude that measurement of involvement should consider the enduring, situational, rational and affective components that influence the accomplishment of the experimental task. Delays are a common occurrence in communication technology, and even in face-to-face communication, we often feel “out of sync” with the person with which we are interacting. An understanding of the conditions that can help us to accommodate and adjust for these delays is important for many areas of study of human interaction. We believe that this article has contributed to the understanding of this issue but future research is required to better clarify the effects of different delay amounts with a larger sample and a higher number of levels.

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