A PORTFOLIO OF MEDIA: EFFECTS OF MEDIA SYNCHRONICITY ON COMMUNICATION PERFORMANCE

Research-in-Progress

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Abstract

This paper describes research in progress to empirically test the Media Synchronicity Theory (MST) (Dennis et al. 2008). We conducted an experiment consisting of 55 individuals organized into 13 different teams. The teams were assigned to use a lower synchronous medium, a higher synchronous medium, or a portfolio of media. The teams worked together on a new hidden-profile task, and several variables relating to communication performance were measured. The results of the initial study indicate support for the main hypotheses of the paper and the theory. Teams that used a portfolio of media outperformed those teams that used only one type of medium. However, additional data collection is necessary for significance testing.

Keywords: Media synchronicity, virtual teams, communication performance
Introduction

Innovations in technology have resulted in individuals having many options for communication media. Some of these options include instant text, synchronous audio, real-time video, etc., from virtually anywhere on the planet. It is safe to assume that most people do not think about how the communication media may influence how well they are able to communicate their messages with others. Research has shown, however, that communication media can hinder or help communication (Carlson and Zmud 1999; Daft and Lengel 1987; Dennis and Kinney 1998; Robert et al. 2008; Straus 1996). Consequently, people may be reducing their communication performance because of the communication media they use. Reduced communication performance can contribute to poor decisions or costly or negative outcomes. It is important, therefore, for people to understand which media they should be using based on the needs of, not only their communication task, but the components or processes of their task. It is likewise important for researchers to understand and prescribe which communication media are best suited for different communication processes.

There has been a lot of important theory and development in communication media influence (e.g., Daft et al. 1987; Short et al. 1976; Zigurs and Buckland 1998). In this paper, we focus on a recent theoretical development, the Media Synchronicity Theory (MST) (Dennis et al. 2008). This theory looks at communication tasks from a finer level. And, unlike much of the previous media theories, argues that individuals should use multiple media for the different parts of their communication (Dennis et al. 2008).

Researchers have drawn on and continue to draw from MST for theoretical justification and support for research in several disciplines including information systems (Thomas and Bostrom 2010), communication (Muhren et al. 2009), and decision science (Sarker et al. 2010). Most likely, researchers will continue to use and apply MST in their continuing research. However, MST has received only little empirically validation (e.g., Dennis et al. 1998; DeLuca and Valacich 2005; DeLuca and Valacich 2006). Additional empirical validation of MST will allow researchers to use the theory more confidently and accurately. Additionally, validation will likely enable media-influence research to build upon MST and continue to refine and improve media research and theory. The primary objective of the current research is to empirically test the Media Synchronicity Theory.

The next sections of this paper give background and theory on prior research on media influence as well as MST. The rest of the paper shows the development of the hypotheses and provides information on the task and a pilot study. The pilot study consisted of 55 individuals organized into 13 teams. Although the sample size of the pilot study does not provide enough statistical power to formally test the hypotheses, the results indicate support for the major hypotheses.

Background

Much of the recent history of research on media influence and communication performance has been based on Media Richness Theory (Daft and Lengel 1987). This theory proposes that media differ in their level of richness. The main crux of MRT is that richer media are better for equivocal messages. The logic is that richer media allow more cues and symbols to be communicated. More cues and symbols provide more clues about the intent of the message. These cues and symbols can be of different varieties. However, some examples are the tone and inflection of voice and facial and eye expressions. When the message is equivocal, it may be difficult to understand, or it may be difficult to determine what the sender intended for the message to mean. Richer media that provide more cues and symbols help the receiver to understand the message better because he or she can observe non-verbal or emotional cues. These additional cues allow the receiver to interpret the message, or they help clarify the meaning of the message.

Although there has been some empirical support for MRT, several researchers found inconsistent results, especially dealing with new electronic media (e.g., Dennis and Kinney 1998; Webster and Tevino 1995). These inconsistencies led to further research and theorizing about media influence. Much of this additional research has focused on individuals’ familiarity with the communication medium and the other communication partners.
Carlson and Zmud (1999) proposed that individuals can use lean media more richly to achieve higher performance. Their basis is that when individuals are knowledgeable with the media, the task, or the other team members, they can infer more meaning from lean information. They proposed this as an explanation why individuals using lean media could perform as well as individuals using rich media. Additionally, Robert et al. (2008) showed that social relationships, referred to as social capital, enhance teams’ abilities to properly integrate information. In their research, the authors studied teams that had worked together for a period of time before the task. The authors found that teams with more social capital integrated information better and made higher-quality decisions. The presence of social capital alleviated the consequences of lean media. A final example from prior research is Alge et al. (2003). They studied the temporal orientation of teams. They found that teams with a past or an expectation of a future used lean media to communicate better than teams without experience together. They base their logic on openness and trust and on team members being able to infer more meaning in confusing or equivocal information because of the prior experience or perceived future experience.

Because of inconsistencies found in prior media theories and research (e.g., Dennis and Kinney 1998; Webster and Tevino 1995), researchers have continued to study and theorize about media’s influence on communication performance. In an attempt to overcome the limitations and gaps in prior media research and theory, Dennis et al. (2008) proposed the more generalizable Media Synchronicity Theory (MST). In summary, this theory argues that communication tasks should be considered at a finer level. Each communication task has two fundamental processes: conveyance of new information and convergence on the shared interpretation of existing information. Media differ on certain characteristics, and some of these characteristics are better for the conveyance process and some are better for the convergence process. As a result, individuals should communicate best when they use multiple media: one medium that is better for conveyance and another medium that is better for convergence. Although the idea of multiple media for different communication purposes within a single communication has received some attention and validation (e.g., Stephens et al. 2008), MST specifies how the characteristics of media make them especially suited for conveyance or convergence.

**Media Synchronicity Theory**

Media Synchronicity Theory (MST) (Dennis et al., 2008) explains how different media influence communication performance. One of the important differences between MST and other media theories is the reconceptualization of task into two communication processes: conveyance and convergence. By looking at the level of these processes, rather than at the task as a whole, we better understand the influence of media on communication performance.

Conveyance processes involve the exchange of large amounts of new information. Because of the amount of the information, the sender benefits from having more time to prepare information. This could include verifying the information for accuracy and completeness. Additionally, the receiver of the information benefits from having more time to process the information and to integrate the information into his or her mental model (Dennis et al., 2008). This may include rereading the information or verifying information.

Convergence processes involves coming to a shared understanding of information that is possessed, but the meaning is not agreed upon. With this process, communicators must share small amounts of non-novel information in order to resolve on a shared meaning. This involves discussions about the participants’ interpretations of the information, and includes the rapid exchange and confirmation of short messages and questions. In order for communication to be successful, individuals must engage, to some extent, in both transmission and processing activities (Dennis et al., 2008).

Although there may be differences in task duration and intensity, most tasks consist of conveyance and convergence processes. In order for communication to be successful, individuals must properly convey information and converge on the meaning of the information. “Without adequate conveyance of information, individuals will reach incorrect conclusions. Without adequate convergence on meaning, individuals cannot move forward to other activities as they will lack a shared understanding” (Dennis et al., 2008, p. 580).

The type of medium used for the communication plays a role in the effectiveness of these communication processes. Some media are inherently better at transmitting large amounts of information—conveyance—and others are better for rapid exchanges of small amounts of information—convergence. For example,
detailed instructions on how to create a Web page are best communicated through paper documents or electronic text such as email. In the first place, the creator of the information can reread and rehearse the information thoroughly in order to check for accuracy and completeness. This ensures better transmitted information. In the second place, the receiver can reread and reference the instructions if the instructions are in written text. Compare this medium with a telephone call. The sender may relay a long list of instructions to the receiver of the information. The sender cannot rehearse the message, nor can s/he check it for accuracy or completeness before it is transmitted. Additionally, the receiver cannot replay the conversation, nor can s/he reference the original information.

An additional component of MST is synchronicity. When multiple people work together at the same pace at the same time and with a shared focus, they are working synchronously. Media influence the ability for individuals to achieve synchronicity (Dennis et al., 2008). Consider two individuals, for example, that are exchanging messages by email. There is time that passes between the time the sender of information creates and sends a message and the time that a receiver receives and opens the message. Their ability to work synchronously is hindered by the delays in message generation, transmission, and processing. Conversely, individuals communicating through video conference instantly send and receive information. They are able to work on the same issues at the same time. Synchronicity enhances the convergence process, but it diminishes the conveyance process (Dennis et al., 2008). This is because with convergence, the individuals involved can quickly exchange small information and gauge the level of agreement and respond to questions and misunderstandings immediately (i.e., more interaction and shared focus) (Ballard and Seibold, 2004). With conveyance, synchronicity does not allow the individuals time to think about and craft the proper message, nor does it allow the receiver time to reprocess or integrate the information.

In order to understand the level of synchronicity of media, it is necessary to look at the objective capabilities of different media. MST defines five media capabilities (Dennis et al., 2008). These capabilities are

- Transmission velocity: the speed to which a medium is capable of transmitting a message.
- Parallelism: the capability of a medium to allow two or more messages to be conveyed at the same time.
- Rehearsability: the extent to which a medium allows a sender to rehearse a message before it is sent to a receiver.
- Reprocessability: the extent to which a receiver can reprocess a message one or more times.
- Symbol sets: the number of ways in which a medium can convey a message.

In general, faster transmission velocity leads to greater synchronicity; greater symbol sets leads to greater synchronicity; more parallelism leads to less synchronicity; and more rehearsability and reprocessability lead to less synchronicity (Dennis et al., 2008).

In summary, MST argues that communication performance is based on fitting the media to the communication process and the participants appropriating the technology faithfully. Many factors influence the fit, including team and task familiarity (Dennis et al., 2008). There have been some limited tests of MST in prior research. DeLuca and Valacich (2006) use action research to test the role of media synchronicity for team performance in business process improvement teams. They conclude that the majority of their evidence supports MST. Murthy and Kerr (2003) study the interaction between different task type and communication medium. They also find general evidence to support that asynchronous media are better for conveyance and synchronous media are better for convergence. We extend these studies by empirically testing how teams using different media, including multiple media, perform on the same task.

**Hypotheses**

When individuals communicate using a medium that is lower synchronicity, they will alter their communication behavior based on the specific capabilities of the medium. A lower synchronicity medium has slower transmission velocity. This means that there will be more time between the time individuals send messages and the time that receivers receive the messages. Because of this time, individuals will be
under less pressure to quickly compose and send messages. This should allow them time to gather their thoughts more before composing the message. This time should result in more complete messages with a maximum amount of information. Additionally, a lower synchronicity medium has higher rehearsability. This allows for individuals to rehearse and review the messages they are sending. The result is individuals can check their messages for accuracy and completeness. If there is something left out, they have the ability to recognize it and correct it before the message is transmitted. The ability to rehearse messages should allow individuals to include more relevant information.

Conversely, individuals that use a medium that is higher synchronicity will likely share less information. A higher synchronicity medium has faster transmission velocity. This means that receivers will receive messages immediately after they are sent. The result of this will be individuals will feel pressure to quickly send information so as not to keep others waiting for their message. This pressure will likely cause individuals to miss or skip some of the information that they could share. Furthermore, the higher synchronicity medium will be lower on rehearsability. This will prevent individuals from being able to review the message for completeness.

Hypothesis 1: Teams that use a lower synchronous medium will share more information than will teams that use a higher synchronous medium.

As teams move from information sharing to discussions of the information shared, the capabilities and level of synchronicity of the media will also influence their level of discussions. A higher synchronicity medium will allow individuals to ask questions quicker and more efficiently than a lower synchronous medium. This alone will likely encourage more discussion about the shared information. Also, the higher synchronous medium allows for quicker responses to questions and clarifications, which would also lead to more discussion. Finally, because the higher synchronous medium promotes synchronicity, the individuals participating in the task will likely be more engaged in the discussion. This should lead to deeper thought about the information and more discussion about facts or inconsistencies.

Hypothesis 2: Teams that use a higher synchronous medium will have more discussion about the shared information than will teams that use a lower synchronous medium.

Although members of teams that use higher synchronous or lower synchronous media will perform the different communication processes respectively better, depending on the communication process, the nature of the task is such that one type of medium will lead to better overall performance than the other will. In our context, the task requires a large volume of conveyance. For conveyance-intensive tasks or conveyance processes, the information being shared is new to the recipients. Therefore, if the information is not shared or interpreted properly, the recipients may fail to understand or interpret the information. Lower synchronous media allow the message senders to rehearse what they are trying to communicate. They can ensure that the information is complete and accurate (Dennis et al. 2008), and they can get a feel for the spirit of the message. Additionally, message receivers can reprocess the information in order to recheck initial interpretations and verify content or accuracy. They can also go back to information they may have forgotten. Therefore, the rehearsability and reprocessability inherent with lower synchronous media will result in better performance of conveyance-intensive tasks.

Hypothesis 3: In a conveyance-intensive task, teams that only use a lower synchronous medium will perform better than will teams that only use a higher synchronous medium.

Because all communication tasks are composed of two fundamental communication processes: conveyance processes and convergence processes (Dennis et al. 2008). Asynchronous media should lead to better performance with conveyance processes, and synchronous media should lead to better performance with convergence processes.

Media that are used less synchronously allow the senders to rehearse the information before they send it. This contributes to them being able to verify that the information is complete and accurate and that the essential elements of the information are present before they transmit it. Moreover, the reprocessability capability of lower synchronous media allows the receivers of information to review the information for accuracy and clarity. It also allows them to refer back to the information later. Therefore, lower synchronous media used for the conveyance process will improve this process as compared to a higher synchronous medium for this process.
Convergence processes involve coming to a shared interpretation of previously stated information. These processes rely on exchanging small amounts of information rapidly in order to converge on the shared interpretation (Dennis et al. 2008). Media that are used more synchronously allow individuals to quickly ask questions about the interpretation of the information. There is less of a need for rehearsing and more of a need for quicker exchanges of small amounts of information. Higher synchronous media improve the convergence process of communication.

When members of teams only use one type of medium to communicate, they will perform well on the communication process that is better suited for that type of medium. The members of the teams that use both processes will be able to capture the strengths of the lower synchronous and the higher synchronous media to do both processes well. They will use the lower synchronous medium to share the novel information, and they will use the higher synchronous medium to ask questions about and converge upon the meaning of previously shared information. Therefore, teams that are able to use both types of media should perform better than teams that only use one type of medium.

Hypothesis 4: Teams that use a portfolio of media will perform better than will teams that use only one type of medium.

Methodology

Participants

For our experiment we recruited 55 participants. These participants were randomly assigned into teams with 3 or 4 members each. With three treatment groups, we had a sample size of 13 total teams with 4 or 5 teams per treatment. All of the participants were students from a large university in the United States. These students were undergraduates majoring in a business field. We recruited students from several business courses.

Task

The teams in our study participated in a team decision making task we refer to as the international education program task. Many of the tasks used in media-influence research are hidden-profile tasks. Hidden-profile tasks are tasks in which all the members of a team possess common information that favors an inferior choice. However, the individual members of the team have some amount of private information that favors a superior choice. Without each team member sharing their private information, however, most individuals are unable to detect the superior choice on their own. Teams that successfully share all their private information should be able to recognize the superior choice (Stasser and Titus 2003). The logic behind these types of tasks is that teams that communicate well will choose the correct solution while teams that communicate poorly will not. This allows researchers to isolate the effects of media on communication performance. However, success or failure in typical hidden-profile tasks may actually be a result of information recall or group confirmation bias rather than the result of good or bad communication (Lightle et al. 2009).

The international education program task developed for this research is an adaptation of the international studies institute admissions case (Zigurs et al. 1988). We adapted this case into a hidden-profile task. The task overcomes some limitations of prior hidden-profile tasks by greatly increasing the volume of information shared, yet allowing the participants to keep all information. Because of this, participants do not need to rely on memory recall for information. The information, however, is extensive enough that the individuals cannot simply share the information they have verbatim. This allowed them to share accurate, complete information with each other.

In this task, each team member is given information about an international education program sponsored by the university. The team members act as if they are the admissions committee that decides which student to admit into the program. All of the candidates have strong academic ability, so the committee must look for several subjective factors like personality traits. Each team member is given complete information about only one applicant. The information they are individually given includes three essays written by the applicant and two letters of recommendation. The participants must then share the
information that they have with the other members of their team. The teams must then come to an agreement on which applicant they choose to admit to the program. The amount of common information is quite small in this task yet it slightly favors a sub-optimal applicant. However, the full information favors an optimal candidate. The optimal candidate is designated because of manifestations of meeting or exceeding the requirements for the program. When all applicants are considered together, the optimal candidate’s information and experiences are superior to the other candidates.

This task is heavy on conveyance, yet it still requires quality convergence. The conveyance process was operationalized through the initial information sharing portion of the task. Because individuals did not have information about the other three candidates in the task, the team members were individually required to share this information with the other members of their team. This information was completely novel to the other team members, and there were large amounts of information to convey. The convergence process was operationalized through the discussions about the information that had been conveyed. The members of the teams had to discuss the information that had been shared until they could arrive at consensus decisions.

The number of applicants under consideration is based on the number of individuals on the teams: one applicant per participant. The size of the teams varied between three and four members. It was most common for teams to have four members participate.

**Procedure**

The teams in this study were randomly assigned to one of three treatments: lower synchronicity medium, higher synchronicity medium, or a portfolio of media. The lower synchronicity medium selected for this task was email. The higher synchronicity medium was video conference. The portfolio of media involved email for the conveyance process and video conference for the convergence process. All of the teams were virtual teams in that they had no face-to-face communication about the task.

We chose to classify the media as lower synchronicity and high synchronicity instead of asynchronous and synchronous. The basis for this, is even though media have different capabilities that make them higher or lower on synchronicity (Dennis et al. 2008), they may not necessarily always be used asynchronously or synchronously. However, email is considered to be lower in synchronicity than is video conference.

All participants were randomly assigned to receive information about one of the applicants to the international program. The participants were then given a specific information packet that contained the background information for the international education program and their specific applicant information. They were given time to thoroughly read through the instructions and the information, and then they were provided with access to the medium. After all the participants on each team felt comfortable with the instructions, the teams began sharing and discussing information. The teams were not given a time limit; however, most of the teams arrived at a conclusion in approximately 45 minutes. After the teams came to consensus decisions, the individuals completed a short survey.

In the lower synchronous medium condition, the members of the teams only had access to email. Each message that was compiled by an individual on a team was sent to all the members of the respective team. Additionally, when an individual replied to an email, the reply was sent to all members of the respective team. In general, all messages were read by all the members of each respective team, and all messages received a reply from one or more members of the respective teams. The members of each team exchanged email messages until they made consensus decisions on which applicants to accept to the program.

In the higher synchronous medium condition, the members of the teams only had access to a video conference program. This program provided multi-point audio and video. Each individual viewed a monitor with video and audio feeds of each member of his/her team along with a video feed of himself/herself. A moderator initialized the video conference program after all individuals on the teams completed reading the information about the task and the respective candidates. After the video feed was activated, the team members exchanged information about each of their candidates, discussed the information, and came to a consensus about which candidate to admit to the program.
In the portfolio of media condition, individuals on each team only had initial access to email. They were each instructed to compose a single message that included any relevant information about their respective candidates. They sent their messages to all members of their team. However, they were not allowed to respond to the emails or ask questions about the candidates at this time. After each member of the team read through each of the emails from their team members, they switched to video conference. A moderator activated the video conference once all the members of the team were logged in. At this stage, the individuals on the teams discussed the information that had been conveyed through email until they reached a consensus decision.

Measures

The main dependent variable for this study was whether or not the teams selected the optimal candidate for the program. We assessed how well teams did in the admissions task relative to the correct solution. This is a categorical variable in that the teams either choose the right applicant or they do not. Teams that chose the correct applicant received a 1; teams that failed to choose the correct applicant received a 0. We recorded the email and video transmissions of the teams’ communications so that we could review the video and transcripts to measure the amount of information shared as well as the quality of the communication. We also measured individuals’ perceptions of the team and communication task and processes.

Results

The sample size of this study is too small to detect significance in the dependent variable. However, the results indicate support for some of the main hypotheses and some of the main arguments of MST. We recognize that more testing is necessary to make conclusions and to confirm our hypotheses, and we intend to continue that testing. However, we provide here some of our observations from this work in progress.

We analyzed the email and video transcripts to look for patterns and to compare the amount of information shared and discussed in each group. The amount of information shared actually varied largely among the different teams. One team only averaged sharing 5 pieces of information per person, while the highest team averaged sharing 32 pieces of information per person. Additionally, we found that the amount of discussion of the information also varied among the different teams and conditions, and initially, our results do not indicate that higher synchronous medium teams discuss more information than lower synchronous medium teams.

We have observed from our study that teams that used a lower synchronous medium do appear to outperform the teams that used a higher synchronous medium. The lower synchronous teams successfully chose the optimal applicant 40% of the time, whereas the higher synchronous teams never (0%) selected the correct applicant. Most importantly, the teams that used a portfolio of media (email and video conference) selected the right applicant 60% of the time. Even though we do not have a large enough sample to confirm our hypotheses, the data indicate that teams that use an lower synchronous medium for conveying information and a higher synchronous medium for converging upon information make better decisions than do teams that rely on only one type of medium.

Discussion

Through this research, we found that teams performed better when the communication needs were matched with the right medium. The task in this study required a large amount of conveyance. Therefore, the teams that used a lower synchronous medium to communicate outperformed the teams that used a higher synchronous medium. Although we expected that the lower synchronous teams would perform slightly better, we did not expect all the higher synchronous teams to fail to arrive at the correct decision. Media with greater social presence or richness has typically been argued to be superior. In our initial study, however, those teams that used richer media performed poorly. Without quality conveyance, it is likely that the higher synchronous teams did not share enough information or they did not accurately
interpret the information that they had. Again, however, the teams that used a portfolio of media made the correct decision more than the other teams did.

In reviewing the transcripts of the teams’ discussions, we noticed interesting patterns in the communication. Different teams shared various amounts of information regardless of the type of medium they used. Some teams synthesized the information better than other teams as well. Also, it is likely that there are other factors influencing the decision quality of the teams. For example, if the person who had the best applicant was shy or passive, s/he would not challenge the other members’ candidates. However, this did not seem to influence the lower synchronous medium teams as much. Also, the members of each team were randomly assigned applicant information, so there should not have been consisted biases.

In this paper, we have looked at how media influence communication performance. We demonstrated that different communication processes benefit more from synchronicity than do others. We showed that for a conveyance-intensive task, a lower synchronous medium (email) does appear to be better than a higher synchronous medium (video conferencing). We also believe that a portfolio of media (lower synchronous and higher synchronous) is best. However, because of our small sample size, we will need to conduct additional research to test the significance of our findings.

References


