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Multicommunicating: Juggling Multiple Conversations in the Workplace

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As a result of newer communication technologies and an increase in virtual communication, employees often find themselves multicommunicating, or participating in multiple conversations at the same time. This research seeks to explore multicommunicating from the perspective of the person juggling multiple conversations at the same time—the focal individual. To better understand this phenomenon, we extend previous theorizing by including the concepts of the episode initiator (whether the second conversation was focal or partner initiated), the fit of the set of media used in the episode, one process gain (conversation leveraging), and process losses. Employing a series of pilot studies and a main study, the resulting model was analyzed using structural equation modeling, finding overall support for the model. Findings suggest that experienced intensity is an important factor influencing process losses experienced during multicommunicating, whereas episode initiator influences process losses and the process gain. Further, media fit moderates the relationship between intensity and process losses. The importance of multicommunicating in the workplace is discussed, the theoretical and practical contributions of this research are described, and limitations and suggestions for future research are outlined.

Key words: multicommunicating; polychronic communication; multitasking; dual-task performance; fit; productivity; process losses; intensity; PLS
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Traditionalists say the use of BlackBerrys and iPhones in meetings is as gauche as ordering out for pizza. Techno-evangelists insist that to ignore real-time text messages in a need-it-yesterday world is to invite peril. (Williams 2009, p. A1)

With the proliferation of new communication technologies and the increase in virtual communication (Morello 2005), many workers are expected to be continually "online." They need to be constantly available to their customers, coworkers, and managers and feel pressure to answer an incoming call, reply to an email, or write a quick response to an instant message even when they are already engaged in a telephone call, face-to-face conversation, or ongoing meeting. As a result, workers often find themselves participating in multiple overlapping interactions.

This behavior is termed *multicommunicating* (MC) and occurs when an individual (the *focal individual*) engages in multiple overlapping conversations with multiple others (the communication *partners*) within a given time period (Turner and Tinsley 2002) such that the conversations show a pattern of interleaved speaking turns (Reinsch et al. 2008). Examples include an employee sending an instant message to a coworker while on the telephone with a client or a manager reading an email on her BlackBerry while in a face-to-face boardroom meeting. Researchers in the areas of management information systems (MIS), human-computer interaction (HCI), and computer-supported cooperative work have all highlighted the practice of MC (e.g., Cameron and Webster 2005, Kakihara and Sorensen 2001, Nardi and Whittaker 2002).

The current prevalence of communication technologies facilitates MC (Reinsch et al. 2008). For example, two face-to-face conversations occurring at the same time will often merge and become a group conversation, whereas newer technologies make it easier to maintain two distinct conversations (where each conversation partner may or may not be aware of the other conversation). Thus, the goal of this research is to increase our understanding of MC where at least one of the conversations is technology mediated.[1] Because studying the impacts of our technologies (Benbasat and Zmud 2003) and investigating

[1] This research does not study MC involving two face-to-face conversations but focuses on MC where at least one of the conversations is technology mediated. In order to understand the effects of technology-mediated MC, we examined a wide range

the transformative nature of technologies for communication and work tasks (Agarwal and Lucas 2005) are core properties of the MIS discipline, MC represents an interesting opportunity for IS researchers.

It has been proposed that MC can result in gains for organizations. For example, employees may be more available to colleagues (Cameron and Webster 2011, Turner and Reinsch 2007), become more efficient as they hold concurrent discussions with others to help shed light on an issue (Reinsch et al. 2008), or integrate information from diverse sources to develop more creative solutions (Turner and Reinsch 2007). However, a potential problem with MC is suggested by the multitasking literature: people have problems performing two even relatively simple tasks at the same time (Pashler 1994). Given the efficiency-seeking approach of most organizations, it is important that employees and managers understand the production-related outcomes of MC as well as any factors that influence these outcomes.[2] Therefore, this research seeks to address the following research question: In an organizational context, what are the relevant production-related outcomes of MC for the focal individual and what factors influence these outcomes? In this research we focus on the *MC episode*, a communication experience where multiple conversations show a pattern of interleaved speaking turns.

To address this research question, we draw largely on the theorizing of Reinsch et al. (2008) about MC. We extend their work by incorporating two additional constructs to understand this behavior: media fit and the MC episode initiator. We further refine their work by examining specific process losses and one possible benefit of MC and by offering new insights into the various dimensions of MC intensity. Finally, through a large-scale survey, our work is the first to offer an empirical examination of the production-related outcomes of MC.

Understanding Multicommunicating

Multicommunicating represents the managing of multiple conversations at the same time that show a pattern of interleaved speaking turns (Reinsch et al. 2008). We consider MC to be a particular type of multitasking. MC and multitasking have significant overlap: both involve engaging in multiple tasks at the same time and both are affected by the limits of our cognitive processing (Miller 1956). Thus, our understanding of MC can benefit from the existing multitasking literature, including research on dual-task interference, rapid task switching, and cognitive load (e.g., Haigney and Westerman 2001, Hancock et al. 2003, Pashler 1994, Rogers and Monsell 1995). This literature suggests that there are limits to our working memory that in turn restrict our cognitive information processing capabilities (Miller 1956). Performance deteriorates when these limits are exceeded (Sweller 1988, Sweller et al. 1998). Because of these limits, performing two tasks at the same time or rapidly switching between two tasks results in decreased task performance in terms of accuracy and response time (Pashler 1994, Rogers and Monsell 1995). These problems can be partially alleviated (but not eliminated) by practice (Ruthruff et al. 2001, Yeung and Monsell 2003) and physical compatibility of the tasks being performed (Haigney et al. 2000), but they increase with task complexity (Gillie and Broadbent 1989) and age (Verhaeghen et al. 2003).

Although the literature on multitasking can inform our understanding of MC, it still does not speak to all of the particularities of MC. MC is an extremely demanding form of multitasking: in addition to focusing on multiple tasks, individuals must balance different media, conversations, and communication partners (Reinsch et al. 2008). Existing multitasking literature has examined task pairs such as letter classification and number classification (Rogers and Monsell 1995), alphabetic arithmetic and geometric comparison (Yeung and Monsell 2003), transcription and listening (Brown et al. 1988), reading while listening to music (Kallinen 2002), and using cell phones while driving (Haigney et al. 2000). None of the existing research examines managing multiple communications, multiple media, or dealing with multiple communication partners.[3] Thus, additional research attention to MC and its outcomes is warranted.

Theoretical Development

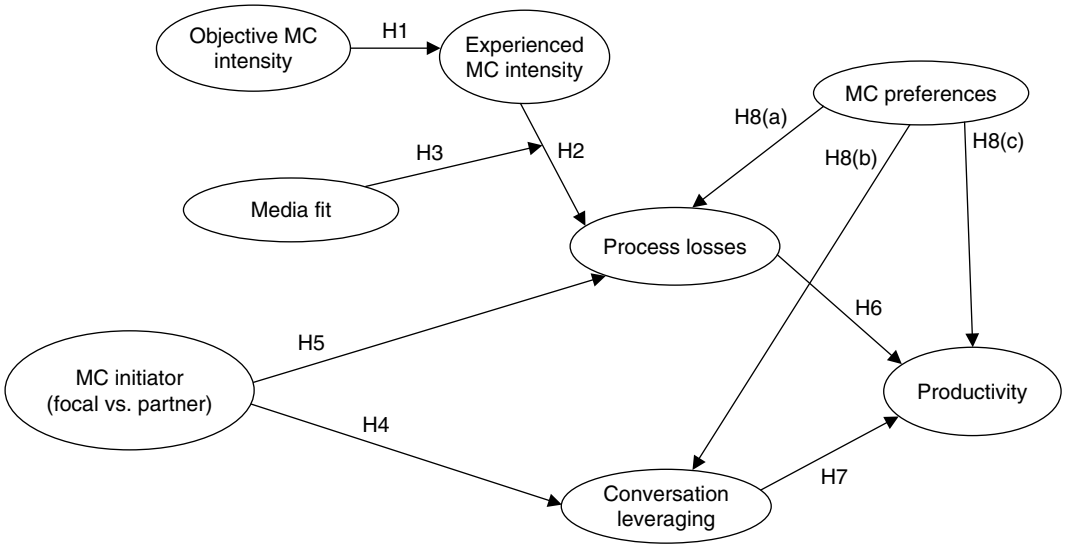
Although communication at work can serve multiple functions such as production (related to the performance of the task), group-well being, and member support (McGrath 1991), this research focuses on production-related processes and outcomes of MC and their antecedents. We examine five process losses and one type of gain—conversation leveraging—relevant in the context of MC. Drawing on existing theorizing on MC (Reinsch et al. 2008), technology fit (Dennis et al. 2001, Goodhue and Thompson 1995, Zigurs and Buckland 1998), and the sender versus

of media pairs (e.g., those that involve some technology such as instant messaging paired with a face-to-face conversation as well as less technical pairs such as face-to-face paired with a telephone conversation).

[2] Communication at work can serve multiple functions: production, group-well being, and member support functions (McGrath 1991). The production function focuses on performing the task and—although other outcomes related to social functions are also important—we are examining outcomes related to the production function in our research.

[3] The cell phone use while driving literature does examine one communication task, but these studies almost exclusively examine driving outcomes, not performance of the communication task.

Figure 1 Model of Multicommunicating Processes and Outcomes



receiver perspective (Straub and Karahanna 1998), we develop model hypotheses (see Figure 1) using real-world examples where possible to illustrate and add richness to our hypotheses' development. These real-world examples come from our observations of and interviews with five employees of different organizations, interviews that were conducted to better understand the nature of this emerging phenomenon.[4]

Multicommunicating Intensity. *MC intensity* is defined as the extent of multitasking during an MC episode. As we describe below, it can be conceptualized as a more objective multidimensional construct (measured formatively) or as experienced intensity (an overall perception measured reflectively). In determining the extent of multitasking, one may *think* of MC as the managing of multiple conversations at the same time, but research in cognitive psychology suggests that—much like a computer processor—the human brain is actually only processing one task at a time and can exhibit processing bottlenecks when working on more than one task at the same time (e.g., Levy and Pashler 2001, Pashler 1994, Pashler et al. 2001, Ruthruff et al. 2003). Most of these studies examine task performance and define bottlenecks in terms of milliseconds. To an observer we may appear to be performing multiple tasks at the same time, but in reality, our brains are feverishly working to switch back and forth between tasks as needed.[5] Each switch incurs a cost in terms of reaction time or cognitive processing (Rogers and Monsell 1995, Sohn and Anderson 2001), and these costs can add up when we are rapidly switching back and forth between many tasks. Further, some switches are cognitively more difficult and thus more costly than others (Yeung and Monsell 2003). Outside of a tightly controlled laboratory experiment, it may not be possible to capture each individual switching cost and total them. Instead, we attempt to assess the intensity of the MC episode to capture the level of switching costs associated with a particular MC episode. We now turn to distinguishing objective from experienced MC intensity.

Objective MC Intensity. Objective MC intensity is formed by episode characteristics such as the number of conversations, social roles, topics, and the complexity of those topics. Each dimension contributes to the number or difficulty of task switches at the cognitive level. For example, Reinsch et al. conceptualize a more intense episode as one where "(a) the number of open interactions is larger, (b) the pace of the interactions is more rapid, (c) the person's evoked social roles are more numerous and more segmented, and (d) the interactions deal with more—and more cognitively challenging—topics" (2008, p. 394). MC intensity describes the multitasking experienced in the episode, but it is distinct from whether or not the focal individual effectively handles the multitasking demanded by the episode. Thus, MC intensity does not measure cognitive load but the multitasking characteristics of the situation (which could result in higher cognitive load). This is similar to the task demands or task characteristics described in the theory of cognitive load (Paas and Van Merrienboer 1994a, Paas et al. 2003).

[4] Details of the methodology used in this exploratory study are available from the first author.

[5] Switching quickly from one task to another does not imply multitasking or MC unless there is some degree of overlap between the conversations in time. That is, switching quickly from conversation A to B to C would not be multitasking but managing tasks sequentially.

Previous MC research has conceptualized but not measured objective intensity or its formative dimensions. Similarly, the multitasking literature has not measured multitasking intensity but has inferred its level from deteriorations in performance (e.g., Bourke 1997, Pashler et al. 2001, Rogers and Monsell 1995) or from increases in cognitive load (e.g., Paas and Van Merrienboer 1994b). We now turn to describing MC intensity's dimensions.

Number of Overlapping Conversations. We define the number of overlapping conversations in an episode as the maximum number of focal individual conversations open at one time—that is, begun but not yet terminated during the episode. For example, if the focal starts conversation A, then conversations B and C, and then terminates conversation A and B, she or he was involved in a maximum of three overlapping conversations during the episode. However, if the focal starts conversation A, then conversation B, then finishes conversation A before starting conversation C, she or he was involved in only two overlapping conversations. Our exploratory interviews revealed some anecdotes of three, four, and even five conversations at one time, but most were two overlapping conversations.

Multitasking research generally examines two tasks at one time and has not compared the effects of differing numbers of tasks (e.g., Levy and Pashler 2001, Pashler 1994, Rogers and Monsell 1995, Van Selst et al. 1999). The multitasking literature does suggest, however, that each task to which we attend has an associated *task set*—a configuration of cognitive processes outlining the rules, appropriate responses, motor processes, etc., necessary for the performance of that task (Sakai 2008). Being able to switch back and forth between tasks requires that we actively maintain these task sets in working memory, and it takes cognitive effort to maintain each task set. The higher the number of tasks, the higher the number of task sets that need to be maintained, increasing our cognitive processing (Rogers and Monsell 1995). For MC, the higher the number of overlapping conversations, the higher the number of task sets that need to be stored in working memory and the higher the cognitive switching costs. This supports the Reinsch et al. (2008) proposition that the number of open interactions or conversations is an important dimension of intensity.

Pace of Switching. We define pace of switching as the frequency with which the focal individual shifts attention between conversations. One of our interviewees reported a "mental moment of losing [his] thought" during rapid switching between conversations. However, we observed that employees were largely able to handle slower switching between conversations—e.g., giving a response to a single question in a second conversation and then returning to the first conversation—without disrupting the flow of the first conversation. Faster paced switching between the multiple conversations means that our brains not only have to process the content of the multiple conversations themselves but also face an increasing number of switching costs.

Multitasking research has also found that predictability and foreknowledge regarding the change from one task to another (e.g., a predictable pace) partially reduces the switching costs (Rogers and Monsell 1995, Sohn and Anderson 2001). In MC, any jumps or switches between conversations usually follow the flow of the conversations. There is little predictability because the timing of the switching is not completely under the control of the focal individual but depends on the actions of the communication partners. Because MC is a type of multitasking where it is particularly difficult to predict switches in advance, the effects of faster paced switching may be exacerbated. Thus, consistent with Reinsch et al. (2008), we conceptualize pace of switching as an important dimension of intensity.

Segmentation of Social Roles. Segmentation of social roles is the extent to which the focal individual draws on different social roles in each MC conversation. One interviewee reported concerns when juggling a client telephone conversation at the same time as engaging in a face-to-face conversation with a family member—an example of highly segmented roles. When managing multiple conversations as part of his customer support function, however, the same individual did not even consider that this was an example of MC. As evidenced in these illustrations, MC is an inherently social phenomenon; during conversations, individuals are enacting particular social roles and drawing on stored role schemas to determine the set of behaviors that are appropriate for those roles (Fiske and Taylor 1991).

Because managing role schemas and other relationship processes during a conversation requires cognitive processing, people have limits on how many different roles they can effectively support at one time (Brodt et al. 2002). When dealing with multiple conversations involving separate social roles, focal individuals may have to draw on multiple internally stored schemas to communicate with their multiple conversation partners. Individuals must make transitions by switching between these social roles, which can result in role conflict and higher intensity (Reinsch et al. 2008). Conversely (like our interviewee above), managing multiple conversations while fulfilling the same social role may be perceived as lower intensity MC because only one role schema needs to be managed. Thus, consistent with Reinsch et al.

(2008), we model the segmentation of social roles as a dimension of intensity.

Differences in Topics. Reinsch et al. (2008) suggest that the number and the challenge of the topics during MC represent another dimension of intensity. However, we conceptualize these as two separate and important dimensions of intensity: differences in topics and topic complexity.

Differences in topics indicates the extent to which the topics in each MC conversation are dissimilar. Our observations and interviews suggest that similarity between topics used in each conversation may reduce, whereas dissimilarity may increase, intensity. One of our interviewees related an MC episode in which it was difficult to multitask because the two conversations were about different topics. Further, some focal individuals attempt to only multicommunicate when the conversations have similar topics (Turner and Reinsch 2007). When the topics are similar, only one set of task information (e.g., information on the context of this particular topic) needs to be retained in working memory, reducing the amount of cognitive switching required. When MC happens with two different topics, focal individuals need to retain information about both topics in working memory and need to alternate between the sets of information to appropriately respond and contribute to the multiple conversations. Thus, we propose that it is differences in topics rather than number of topics that increases intensity.

Complexity of Topics. Topic complexity is a function of objective topic characteristics that increase the cognitive demands placed on the focal individual (Campbell 1988). These characteristics could include elements such as the number of interrelated or conflicting sub-elements (Campbell and Gingrich 1986), the number of decisions and decision criteria (Fisher et al. 2003), the multiplicity of alternative paths for achieving the same goals (Terborg and Miller 1978), and the associated level of uncertainty (March and Simon 1958).

All of our interviewees discussed the issue of topic complexity, leading us to propose this as an important dimension of intensity that is separate from differences in topics. One manager explained that he regularly brought his laptop and checked his email during low complexity meetings (such as those involving information sharing rather than decision making) because those types of meetings require less focus and, as a result, are appropriate for MC. Prior research has also found that multitasking with high complexity tasks may overload an individual's cognitive resources (Gillie and Broadbent 1989, Nunes and Recarte 2002). Similarly, group support systems researchers suggest that complexity may increase demands for cognitive attention, and they call for further research on the topic (Heninger et al. 2006). Drawing on media richness theory (Daft and Lengel 1986), Turner and Reinsch (2007) propose that employees will face multiple and conflicting interpretations of issues as MC topics become more equivocal. With higher equivocality, employees will be less likely to multicommunicate (Turner and Reinsch 2007). In support of this, they found that the most frequently occurring theme in a qualitative study of MC was topic complexity and, with more complex topics, employees were less likely to multicommunicate. Further, in an MBA student vignette study, they found that higher equivocality related to a lower likelihood of MC.

Topic complexity increases the difficulty of switching from one task to another and, thus, contributes to MC intensity. Further, we propose that the topic complexity of each conversation contributes independently to MC intensity. That is, one conversation could be low whereas the other one is high in complexity with the complexities of both conversations contributing to intensity. Similarly, past researchers have not examined overall complexity but have argued that it is the complexity of each conversation that is important (e.g., Turner and Reinsch 2007).

Experienced MC intensity. Although intensity can be an objective assessment of the extent of multitasking during a MC episode, experienced intensity subjectively measures an individual's perception of this. Although the objective and experienced measures should be related, they are not equal: the same objective extent of multitasking may be experienced as more intense by some persons and less intense by others. Taking into account the Reinsch et al. (2008) theory, as well as our extensions above, we expect that objective intensity will be related to experienced intensity.

Hypothesis 1 (H1). *Objective MC intensity—determined by the dimensions of* (a) *number of overlapping conversations*, (b) *pace of switching*, (c) *segmentation of social roles*, (d) *differences in topics*, *and* (e) *complexity of topics—will influence experienced MC intensity.*

It is important to note that it is the experienced, rather than the more objective, intensity construct that is important to the outcomes of intensity.

Experienced MC Intensity and Process Losses. Reinsch and colleagues (2008) propose a relationship between MC intensity and performance. Those episodes that are experienced as more intense can impose a higher load on the focal individual's cognitive functioning. There are limits to our cognitive information processing capabilities, and performance deteriorates when these limits are exceeded (Miller 1956, Sweller 1988, Sweller et al. 1998). The idea of limited working memory has been used in many areas of research including group support systems (Grisé and Gallupe 1999),

decision support systems (Speier et al. 2003), electronic communication (Brodt et al. 2002, Hiltz and Turoff 1985), knowledge management (Gray and Meister 2004), and HCI (Nilsson and Mayer 2002). For instance, Heninger et al. (2006) found that individuals who were both reading and contributing to group support tasks experienced reduced information processing as compared to those who only read. Consequently, episodes that are experienced as higher in MC intensity should result in more process losses.[6]

Although Reinsch et al. (2008) propose a relationship between intensity and performance, they do not theorize about what is meant by performance in the context of MC. Using an input-processing-output approach, we differentiate between the impacts of experienced intensity on the specific behaviors, actions, and states that we experience during the MC episode (captured by *process losses*—Alavi 1994, Pinsonneault et al. 1999, Steiner 1972) and on outcomes (captured by *productivity*—see below). In the group decision literature, process losses are defined as factors that inhibit the groups' generation of ideas (Pinsonneault et al. 1999). For MC, we define process losses as the series of actions, behaviors, or states experienced during the MC episode that inhibit the focal individual from accomplishing his or her communication tasks.

Specific process losses emerged during our exploratory observations and interviews. When juggling multiple, complex conversations, interviewees reported errors during MC such as spelling mistakes in typed messages. They also sometimes experienced confusion and reported that it was like "losing your thought" during the MC episode. In one episode, the focal individual was asked a direct question twice in a row and had to ask that the question be repeated a third time before he was able to respond. In addition, one interviewee exhibited a delay of several seconds in a face-to-face conversation when also checking his BlackBerry, and another reported that "it may be 5 to 10 minutes before you respond and someone might think that you have fallen off the face of the Earth." In another example, one employee received some texts while in an interview with the first author. The employee averaged 101 words each time he spoke to the author before receiving the texts and 16 words each time he spoke during the texts, exhibiting reduced participation in the interview. Thus, process losses relevant in the context of MC are errors, confusion, repetition, slower responses, and reduced participation on the part of the focal individual.[7] In line with limited cognitive processing, and using the outcomes that emerged during our exploratory study, we propose that increases in experienced intensity should increase these process losses:

Hypothesis 2 (H2). *Higher experienced MC intensity will result in more process losses*.

Media Fit. The notion of fit has been extensively studied in the MIS literature (Daft and Lengel 1986, Dennis et al. 2001, Dennis et al. 2008, Goodhue and Thompson 1995), and we suggest that this literature must incorporate another fit construct—medium-to-medium fit (herein termed *media fit*)—that is important for MC. In our exploratory study and the existing literature (Turner et al. 2006, Woerner et al. 2004), certain combinations of media were used more frequently than others. Reinsch et al. (2008) propose that certain technologies have features that are particularly supportive of MC. We propose that it is not only the features of a single technology that are important, but the fit of the *set* of media that are used during MC. Further, it is not just the media themselves that are important (e.g., pairing telephone with instant messaging), but the media capabilities or the "potential structures provided by a medium" (Dennis et al. 2008, p. 583) that should be examined (e.g., pairing two media without visibility). Thus, we examine *media fit*, or the extent to which the capabilities of the medium used for one conversation complement the capabilities of the medium used for the second conversation (Cameron and Webster 2011). Although fit is a widely used term, its "precise nature and meaning are rarely stated" (Joyce et al. 1982, as cited in Zigurs and Buckland 1998, p. 322). In our study, media fit is an episode-neutral, context-free assessment of fit that only takes into account the characteristics of the media.

We hypothesize that media fit moderates the relationship between experienced intensity and process losses. That is, when media fit is low, an increase in intensity will result in an increase in process losses as our communication activities start to overtax our cognitive resources. In contrast, when media fit is high, an increase in intensity may not result in an increase in process losses because we are able to use the characteristics of the media pair to mitigate the damage or

[6] Reinsch et al. (2008) suggest a U-shaped relationship with intensity first increasing and then decreasing performance. This type of relationship is supported by distraction-conflict theory (Baron 1986) and research on work interruptions (Speier et al. 2003), which would suggest that paying attention to two rather than one task at a time leads to increased arousal and a narrowing of attention that allow the individual to perform better. The data in our present study, however, only examine engaging in two conversations at the same time and do not compare one versus two conversations. Thus, our data should not exhibit the first upward slope in performance, and we predict a linear relationship. To be thorough, we did test for curvilinear effects and, consistent with our theorizing, did not find them in our data.

[7] These are the process losses which emerged during our exploratory study but are not necessarily *all* of the process losses relevant to MC.

reduce our cognitive load during these episodes. We provide the rationale for this moderator relationship in our discussion of media fit that follows.

Hypothesis 3 (H3). *Media fit will moderate the relationship between experienced MC intensity and process losses*.

We adopt the profile-deviation perspective of fit: how well the media fit together depends on the extent of "adherence to an externally specified profile" (Venkatraman 1989, p. 433). Researchers develop these externally specified profiles either theoretically or empirically by using data not part of the main model testing (Venkatraman 1989). We did both, developing theoretically derived profiles and then testing these profiles with data from another study (see online Appendix 3, available at http://dx.doi.org/10.1287/isre.1120.0446). Our media fit profiles were theoretically derived by examining combinations of specific media capabilities. Although future research may find other media capabilities to be important, our exploratory observations as well as the existing literature led us to focus on four capabilities: reviewability, revisability, visibility, and delayability.

A medium with reviewability means that messages are available for review later in the conversation (Clark and Brennan 1991; termed *reprocessability* in Dennis et al. 2008). Email and most instant messaging programs support the review of messages from earlier in the conversation. In our exploratory study, three MC episodes were observed where the focal individual had to ask the person at the other end of the telephone to repeat what was said. However, such repetition was not observed in any MC episodes involving at least one medium with reviewability. Multicommunicating with media that have reviewability means that episodes experienced as higher in intensity do not result in process losses: because focal individuals are able to review messages from earlier in the conversation, they do not need to hold as much information about that conversation in working memory because it is readily available. They have more cognitive resources to devote to effectively manage the multiple conversations and limit their process losses. In addition, although focal individuals may need to expend extra cognitive effort reviewing the messages, the messages are available for review at a later time and they can engage in the reviewing during a cognitive lull in the episode.

Revisability means the medium allows messages to be changed before sending them (Clark and Brennan 1991; termed *rehearsability* in Dennis et al. 2008). Email and most instant messaging programs allow focal individuals to revise messages before sending them. One employee revealed that she commonly wrote emails while on the telephone. However, she would always quickly review an email for content, spelling, and grammatical mistakes before sending it. With media that support revisability, high experienced intensity episodes are less likely to result in process losses such as errors or confusion because focal individuals can create a draft version of what they would like to say and then revise it if needed. In media without revisability, focal individuals must attempt to compose a perfect final version mentally because they cannot refine their messages. In a high intensity episode, this overloads the focal individual's cognitive processing and makes it more likely that process losses will be experienced.

During face-to-face conversations, focal individuals communicate with all of their senses. Facial expressions and body movements are interpreted by the communication partners, whether those expressions were expressly intended for that conversation or not. However, a medium with invisibility does not allow these visual cues to be exchanged during the interaction (e.g., telephone, email, or instant messaging). Invisibility is related to the Reinsch et al. notion of *compartmentalization*, or "the extent to which a medium restricts the concurrent availability of communicative cues from an interaction to only those participating in the interaction" (2008, p. 396). Visual cues are one type of cue that can be restricted during MC. Invisibility makes it easier to compartmentalize the different conversations, and the focal individual does not have to expend effort masking facial reactions to the other conversation. Thus, invisibility of *both* media is needed to reduce the cognitive effort associated with masking facial reactions (for example, even when only one of the conversations is face to face, masking is required). In high experienced intensity episodes, the effort associated with controlling facial expressions increases the focal individual's cognitive load, increasing the likelihood of process losses.

Although different media have some inherent amount of delay as a result of their physical characteristics (a letter may be in transit for days, an email in transit for minutes, a word uttered on the telephone in transit for nanoseconds), our concept of delayability also includes an element that is socially construed. That is, delayability is also derived from what is socially allowed in the use of that medium (Dennis et al. 2008). We define a medium with delayability as one that allows communicators to delay their responses or vary the tempo of their conversations (termed *flexibility of tempo* in Reinsch et al. 2008). Communicators can maintain flexibility by including at least one medium in which a communication partner will tolerate delayed responses (Reinsch et al. 2008). For media such as email, and to a lesser extent instant messaging, the delay can be long and it may be some time before partners "think you have fallen off the face of the Earth" (interviewee). However, for face-to-face

and telephone conversations, "you have to be continuously answering, so any little distraction could be too much" (interviewee). During a high experienced intensity MC episode, the cognitive load of the focal individual is constantly changing depending on the demands of the moment, creating a pattern of peaks and valleys. It is during these peaks that the focal individual's cognitive load may be too high, leading to overload and process losses. MC using at least one medium with delayability means that the focal individual can delay his or her responses during peak periods in the conversation using that medium, responding instead during a "valley" or lull in the other conversation. Smoothing out these peaks and valleys enables the focal individual to minimize moments of cognitive overload and results in fewer process losses.[8]

Given the arguments above, media fit will be higher for a pair of media when at least one has the capability of reviewability, revisability, and delayability and both have invisibility. Thus, we suggest that the media pairs with highest media fit are those that include at least one medium with delayability, reviewability, and revisability and both media with invisibility (e.g., instant messaging paired with telephone), whereas moderate media fit are pairs with at least one medium with delayability, reviewability, and revisability and one medium with visibility (e.g., email paired with face-to-face). The remaining media pairs are considered low media fit.[9]

Conversation Leveraging. One should not solely focus on the process losses associated with MC without considering that there may also be gains or benefits associated with this behavior. One possible advantage of MC that emerged in our exploratory study was conversation leveraging, or the focal individual's use of information from one conversation to "invest" in another conversation. We observed several examples of focal individuals gathering information from one conversation and using it immediately in the other conversation. As one interviewee explained,

> When I am on conference calls, sometimes I am aware of people who have input that could be valuable to the conversation at hand. Somebody has a question and I remember talking to somebody about that [issue] and it's someone who is not participating here. I'll send off an [instant message] to get an immediate response such that I don't have to interrupt the [conference] call.

Other benefits of MC may exist, but the present research focuses on conversation leveraging as it emerged during our exploratory study and is particularly relevant to production-related MC outcomes.

Multicommunicating Initiator. Although not part of the theorizing by Reinsch et al. (2008), MC episodes can either be initiated by the focal individual (i.e., the focal individual is engaged in one conversation and initiates a second conversation at the same time) or by a communication partner (i.e., the focal individual is engaged in one conversation and someone else initiates a second conversation with that focal individual). The existing multitasking literature does not shed much light on this construct: it largely examines multitasking that is initiated by some external force or mechanism (e.g., a ticking metronome as described in Rohrer and Pashler 2003 or a tape recorded message used in Brown et al. 1988) and does not examine the performance of self-initiated multitasking. It has been suggested that multitasking may be more voluntary in some cases than in other cases (Persing 1999), but there are no studies to date that compare voluntary and involuntary multitasking.

The importance of the initiator of a conversation has been highlighted in computer mediated communication (CMC) research: when a message is initiated, it is usually at the convenience of the sender but not necessarily the recipient of that message. Recipients may not always be available or the timing of the message may be inconvenient for them (Straub and Karahanna 1998). However, this sender-receiver divide has not been examined when managing multiple conversations at the same time. We propose next that whether the second conversation is focal individual or partner initiated has effects on both conversation leveraging and process losses.

Initiator and Conversation Leveraging. The initiator of the second conversation may influence conversation leveraging. Although some focal individuals decide to MC in an attempt to do more, Rennecker and Godwin (2005) found that the first conversation itself may be the reason the focal individual initiates the second conversation. Similarly, in our exploratory study, the focal individual was always the initiator of the second conversation when conversation leveraging occurred. When the second conversation is focal initiated, the focal individual is able to *purposefully select* the partner for and the timing of the second conversation to maximize the chances that she or he can access the information necessary to achieve the goals of the first conversation. With a partner-initiated second conversation, it would be much less likely that

[8] We thank an anonymous reviewer for this idea.

[9] As described in the results, these profiles for high, moderate, and low media fit were tested using data from another study. In our main study, the media sets reported by our participants were pairs and either possessed all of these last three characteristics (delayability, reviewability, and revisability: e.g., email) or none of the characteristics (such as telephone). Therefore, the three characteristics are treated together when testing H4. However, future research should consider them as separate constructs if the media do not share these characteristics.

another individual would contact the focal individual at the correct time to fulfill his or her needs in the first conversation. Thus

Hypothesis 4 (H4). *Conversation leveraging is more likely when the second conversation is focal initiated than when it is partner initiated.*

Initiator and Process Losses. The initiator of the second conversation may also influence the process losses experienced by the focal individual during MC. In exploratory interviews, four out of five interviewees used the term *interruption* to refer to MC when the second conversation was other initiated (i.e., when the focal individual was part of one conversation and a communication partner initiated a second conversation). Describing other-initiated MC as an interruption implies that the timing of this event is not within the control of the person being contacted. Three interviewees described a process whereby they made a decision concerning whether or not they were going to respond to the interrupting conversation. However, although focal individuals ultimately decide whether or not to respond (e.g., pick up a ringing telephone), they cannot consistently ignore these other-initiated communication requests because timely responses are often a part of their job requirements. Thus, although other-initiated requests to communicate may involve a decision on the part of focal individuals, these requests also imply a general lack of control: the timing and nature of the interrupting conversation is not the focal individual's choice but is "thrust" upon them.

Perception of control is known to result in decreased stress and increased performance (e.g., Dollard et al. 2000, Kushnir and Melamed 1991, Macan 1994, Wall et al. 1996), and research in multitasking provides support for a relationship between control and outcomes. For instance, research has demonstrated that control over interruptions relates to performance (McFarlane 2002) and that low job control and lack of perceived control result in decreased outcomes (Karasek 1979, Macan et al. 1990, Spector 1986). One interviewee recounted an MC episode where someone interrupted her phone call with a quick face-to-face question. Even though she considered that the episode itself was not particularly complex or demanding, she found it difficult to multicommunicate without asking the communication partners to repeat themselves. In contrast, when a focal individual is part of one conversation and she actively seeks or initiates a second conversation, the timing and nature of the MC is at her discretion. In support of this, no themes related to control emerged in our exploratory study when the second conversation was self-initiated. Thus, we propose the following:

Hypothesis 5 (H5). *Process losses are more likely to be experienced during the MC episode when the second conversation is partner initiated than when it is focal initiated.*

Multicommunicating and Productivity. Although process losses and conversation leveraging focus on what is happening during the MC episode, the productivity that results from the episode is also important (McGrath 1991).[10] Productivity can be assessed by effectiveness, efficiency, and how well results meet goals (Burton-Jones and Straub 2006, Campbell 1990, Beal et al. 2003). Therefore, we define productivity as how efficiently and effectively focal individuals complete their communication tasks during their MC episodes. Steiner's (1972) equation—productivity equals gains minus losses—suggests that, all else remaining equal, process losses experienced during MC should result in lower productivity. For example, it is likely that focal individuals who request the same information multiple times during the episode or who are contributing less utterances to the conversation because of MC are not communicating efficiently; it will likely take them longer to complete their communication tasks. Those who are confused and making errors are probably reducing the effectiveness of their conversations and likewise may need more time to clarify the information or fix the errors made during MC. In our exploratory study, one interviewee suggested that too much confusion and too many errors that need to be fixed during MC result in an ineffective use of time. Although the intent of engaging in multiple conversations at the same time is increased productivity, MC with high process losses will reduce the focal individual's productivity. Therefore,

Hypothesis 6 (H6). *Process losses experienced during an MC episode will be negatively related to productivity.*

Whereas process losses should decrease productivity, process gains such as conversation leveraging should enhance the focal individual's productivity. In support of this assertion, one of our exploratory study interviewees noted that conversation leveraging results in on-demand access to time-critical information for the focal individual. It can add value to an existing conversation by solving a problem or resolving an issue in real time, allowing the individual or group of individuals to continue working, thereby increasing their productivity. Consequently, we propose the following:

Hypothesis 7 (H7). *Conversation leveraging during MC will result in higher productivity than MC that does not employ conversation leveraging.*

[10] We do not consider other outcomes such as group well-being or member support (e.g., MC fit that improves performance may not be ideal for enhancing social standing or building relationships). However, given the research showing the impact of task characteristics on outcomes (Dennis et al. 2001, Poole et al. 1985), other outcomes need to be explored in future research.

Multicommunicating Preferences. It is widely acknowledged in the MIS literature that our preferences shape our perceptions regarding behaviors (Davis 1989, Taylor and Todd 1995). One individual characteristic that may be particularly pertinent to MC is the focal individual's preference for MC. Multitasking research indicates that some people "(1) prefer to be engaged in two or more tasks or events simultaneously; and (2) believe their preference is the best way to do things" (Bluedorn et al. 1999, p. 207). Similarly, some focal individuals may have "values, beliefs, and attitudes that predispose [them] to engage in polychronic communication and to regard polychronic communication as a good thing" (Turner and Reinsch 2004, p. 7). This is termed polychronic communication[11] orientation (PCO).

An individual's preference for multicommunicating (as indicated by PCO) should affect communication outcomes (Turner and Reinsch 2004). Those with higher polychronic communication orientations respond more flexibly to organizational norms for using media, whereas those with lower polychronic orientations are less able to switch modes of conversation (Turner et al. 2006). Those with positive orientations toward multicommunicating may view it as a way of increasing their productivity. The participants in our exploratory study exhibited varying preferences toward managing multiple tasks or conversations at the same time. Although several participants indicated that they prefer to work on one activity at a time, the observational data show that their job requirements often influence them to engage in other-initiated multicommunicating even though it was their stated preference *not* to multitask. The data further suggest that participants' orientations may influence how they perceive the outcomes of this behavior. For example, Participant A, who exhibited a positive orientation toward multicommunicating, stated that he personally saw no problems or issues with the behavior. This observed relationship can be explained by cognitive dissonance theory (Festinger 1957), which suggests that individuals prefer consistency between their beliefs and perceptions and are motivated to change one or the other when they are in conflict. Thus, an individual whose beliefs regarding MC are positive would experience discomfort if those beliefs came up against a conflicting perception—such as a particular MC episode experienced as negative. In order to reduce this conflict, the individual may change his beliefs (which tend to be held long term) or, more likely, his perceptions of that one episode (which tend to be more transient). This may lead to a halo bias where the individual tends to more readily see positive outcomes of MC and to downplay its negatives. Thus, an individual who prefers MC behaviors would also perceive higher productivity and higher conversational leveraging—both of which are positive outcomes of this behavior. The same individual would perceive lower process losses or tend to overlook the losses that do occur because these are negative outcomes of the behavior. Therefore,

Hypothesis 8 (H8). *As compared to focal individuals with lower multicommunicating preferences, focal individuals with higher multicommunicating preferences will perceive* (a) *lower process losses*, (b) *higher productivity, and* (c) *higher conversational leveraging*.

Method

For our main study, we employed a survey methodology ($n = 370$) to test the hypotheses; as described below, we also conducted multiple pilot studies before doing so (overall $n = 911$).[12] Because our exploratory observations suggested that managing three or more conversations at the same time is still relatively rare in the workplace, the present study was designed to investigate two conversations at a time (and therefore one dimension of intensity—number of overlapping conversations—was held constant in this research). Thus, H1(a) was not tested.

Because MC is an emerging phenomenon and it is not known in which situations it occurs more or less frequently, our survey was administered to a broad sample of organizational employees from many different organizations and industries, through the StudyResponse Project. This project "facilitates online research for behavioral, social, and organizational science researchers" (StudyResponse Project 2011). A random selection of StudyResponse volunteers who were currently employed received an email requesting participation and providing a link to the survey Web page. StudyResponse has been used in previous management and psychology research and typical response rates are around 15% (e.g., Piccolo and Colquitt 2006). In the current study, a response rate of 17% was received. Sixty-three percent of our sample was female, the average age was 37, the average years of work experience was 16, and the average respondent had at least a college diploma. Although our response rate is typical of other StudyResponse studies (StudyResponse Project 2006), it is fairly low. Examining the data for response bias, we found that age, gender, and education level of those who responded were not different from the demographic

[11] These authors change the term polychronic communication to multicommunicating in subsequent work, and thus polychronic communication orientation could also be termed multicommunicating orientation.

[12] These pilot studies are part of a larger series of studies examining MC in the workplace.

information obtained from the StudyResponse website for the overall panel (overall panel: 66% female, average age 37, 15 years of work experience, and about 2 years of college education). Further, *t*-tests for differences in construct means across waves of respondents found no significant differences.

In the survey, participants were asked to describe a recent incident at work in which they "were in a conversation with one person and were part of a second separate conversation with a different person at the same time." That is, they described an incident that they directly experienced as the focal individual. Any respondents who did not report on an MC episode in which they were the focal individual, who reported on an episode that did not occur in an organizational setting, who reported on two face-to-face conversations, or who could not recall an episode were removed from the sample. Three hundred and seventy usable responses were received (see online Appendix 1 for demographics). Of these, approximately 25% of the episodes involved either instant messaging or email, and the remainder involved at least one telephone conversation (regular, cell phone, or teleconferencing).

Measures. In the survey, respondents were asked to describe (i) their MC episode, (ii) specific details concerning the episode, (iii) some outcomes of the episode, (iv) several marker variables (trust and social desirability) to assess common method bias, (v) a control variable (cognitive failures), and (vi) general demographic information (see online Appendix 2 for details). Before conducting the survey, any new or adjusted measures were tested in card sorts (Moore and Benbasat 1991) and surveys. Card sorts were administered to graduate students ($n = 22$). Pilot surveys were administered to graduate students and employees at a North American university ($n = 81$) and to StudyResponse volunteers ($n = 808$). The measures used in the survey as well as in the pilot studies are described in online Appendices 2 and 3.

Data Analysis and Results. The model was tested using PLS-Graph, a partial least squares-based structural equation modeling (SEM) software package. PLS allows for interplay between theory and data and can be appropriate for research areas that are still in their exploratory stages (Barclay et al. 1995, Chin 1998). A bootstrapping technique with a sample size of 200 (Chin 1998) was used to estimate the significance of the path coefficients. With 370 participants, there should be enough power to detect path relationships as low as 0.2 in this PLS analysis (Marcoulides and Saunders 2006), and the heuristic of 10 cases per most complex multiple regression in the structural model (Barclay et al. 1995, Chin 1998) was more than satisfied.

Most constructs were modeled as reflective. Experienced MC intensity was modeled as a reflective construct whereas objective MC intensity was included as a formative construct. Conversation leveraging was also modeled as formative. Procedures outlined in Petter and colleagues (2007) were used to validate and assess our formative measures. The two items measuring conversation leveraging were highly correlated ($r = 0.81$) and their weights when running the full model indicated a problem with multicollinearity. As suggested by Petter et al. (2007), one of the items (Lever2) was removed, leaving only Lever1 in the analysis that follows.

The formative measure of intensity was conceptualized as a second-order construct made up of multiple dimensions, each captured with reflective items. Although two sets of indicators (reflective and formative) can be assessed using one construct in covariance-based SEM techniques (called MIMIC analysis—for an example, see Barki et al. 2007), PLS does not allow one construct to have both formative and reflective indicators. Therefore, two measures are used—one with the formative items, with a path leading to the experienced measure with the reflective items (called redundancy analysis—Cenfetelli and Bassellier 2009). The strength of the structural path between the formatively measured and reflectively measured constructs indicates the validity of the construct (Chin 2010).

With MC intensity as a second-order formative construct, we employed the method suggested by Chin et al. (2003) and used by others (e.g., Agarwal and Karahanna 2000, Pavlou and El Sawy 2006, Yi and Davis 2003). That is, using the weights derived from a confirmatory factor analysis, we created factor scores for each of the dimensions of intensity and used these factor scores in the structural model. Thus, we first performed a confirmatory factor analysis (to create the factor scores for intensity dimensions and to examine the psychometric properties of all scales). Then we used the factor scores instead of reflective measures for each dimension of intensity and ran the PLS model. We created one factor score each for pace of switching, segmentation of social roles, differences in topics, topic complexity of the first conversation, and topic complexity of the second conversation. The complexity for each conversation was modeled as separate dimensions because we theorize they should independently contribute to experienced intensity.[13] The variance inflation factor (VIF) for each indicator suggests that multicollinearity is not a problem (VIF < 3.3).

[13] The complexity measures for the two conversations do not correlate highly ($r = 0.17$), supporting our idea that they are independent. To test the robustness of our results, we also analyzed our data using one average measure of complexity as well as a factor score of the cross-product between the two to test for multiplicative

Although we measured process losses for both the first and second conversations, we do not analyze process losses separately for each conversation. Given the focus and context of our research, the different process losses encountered for conversation A and conversation B are interchangeable: all are indicators of the extent to which the focal individual is encountering problems during MC and all should be tapping into the overall construct of process losses. When the focal individual's cognitive processing is overloaded, no research exists that would suggest that process losses should be higher for one conversation than the other. Further, no research suggests that there should be differences in which specific process losses are experienced (pauses versus errors versus confusion)—they may all result from cognitive overload. Therefore, we model process losses as one construct with reflective indicators because an underlying construct is predicting the indicators, the indicators covary, the indicators have the same predictors, and dropping one of them does not change what is being measured (Jarvis et al. 2003, Petter et al. 2007).[14]

Measurement Model. First, the measurement model was examined and construct reliability as well as convergent and discriminant validity were assessed. The item loadings and cross-loadings of the measurement model are available in online Appendix 4. Although "established thresholds do not yet exist for loadings to establish convergent and disciminant validity" (Gefen and Straub 2005, p. 93), Comrey and Lee (1992) suggest that factor loadings in excess of 0.71 are considered excellent, 0.63 are very good, 0.55 are good, and 0.45 are fair (Tabachnick and Fidell 2007, p. 649). Forty-four of the items loaded above 0.71, an additional seven loaded above 0.63, two loaded above 0.55, and four loaded above 0.45. All four items of this latter group were from an existing scale, cognitive failures, and did not cross-load on any other constructs. For all constructs, the square root of the average variance extracted (AVE) was greater than 0.50 (see online Appendix 6), providing further evidence of convergent validity (Fornell and Larcker 1981).

Each item loaded higher on its own construct than on any other construct (online Appendix 6), providing evidence of discriminant validity (Barclay et al. 1995). In further support of disciminant validity, each construct's square root of the AVE (online Appendix 6) was larger than the correlation of that construct with any other constructs (Chin 1998).[15] Further, Cronbach's alpha and composite reliability of each construct are all above 0.80 (online Appendix 5), exceeding the thresholds set by Fornell and Larcker (1981).

Common Method Bias. Before the structural model was examined, the potential for the results to be explained by common method bias (CMB) was assessed. Common method biases "pose a rival explanation for the correlation observed between the measures" and can be especially problematic in self-report research methodologies such as surveys (Podsakoff et al. 2003, p. 879). In the present study, multiple methods were used to control and to account for common method bias.[16] The tests performed indicated that CMB is likely not a concern.

Structural Model. Figure 2 depicts the path coefficients and the explanatory power of the PLS results. As described earlier, all constructs were modeled as reflective except for the formative measure of MC intensity and conversation leveraging. The path between the formatively measured objective intensity and the reflectively measured experienced intensity was 0.67, indicating that we are capturing a significant part of the intensity construct, but it is still below the recommended 0.80 threshold (Chin 2010).

Turning to the hypotheses, the factor weights indicate that the multiple dimensions of MC intensity are significant except segmentation of social roles, providing partial support for H1. Because social roles and topics are correlated 0.41 (see Appendix 6), we explored the possibility of multicollinearity by running the model two additional times: first removing topics and then removing social roles. With social roles removed, topics retained its weight of 0.21. With topics removed, social roles' weight was still nonsignificant.

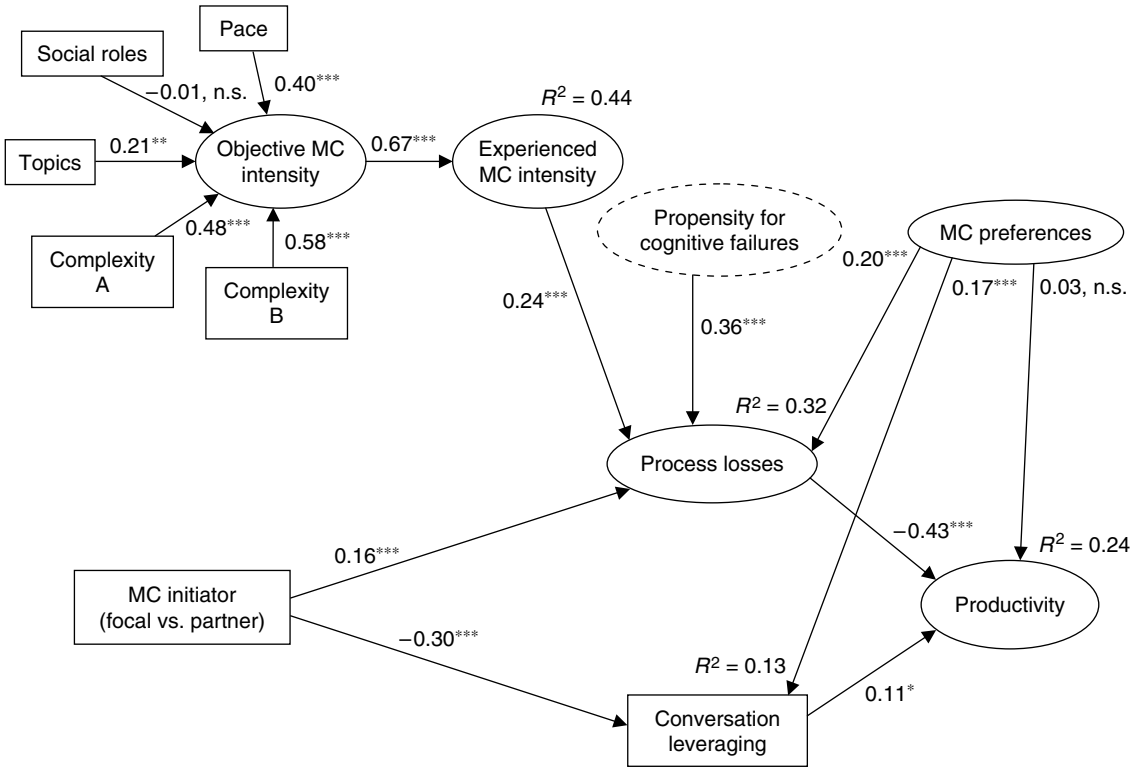
effects. For the average complexity score, the path coefficients were all similar in significant and strength. For the multiplicative effects model, the R^2 of our reflective intensity construct dropped from 0.44 to 0.40.

[14] Our analysis supports this contention: an exploratory factor analysis resulted in one factor (all loadings > 0.68). Further, our results are robust because the paths are similar in strength and significance whether the process losses are modeled as formative, reflective, a simple construct, or a second-order construct.

[15] In online Appendix 6, the correlation between TOPIC and LEVER is −0.72. Although we do not believe that one of these constructs theoretically drives the other, this relationship is to be expected: when the conversations are about different topics, conversation leveraging is not likely because some degree of topic similarity is a necessary but insufficient condition for conversation leveraging.

[16] First, a theoretically unrelated marker variable, propensity to trust, was embedded in the survey (Lindell and Whitney 2001). The nonsignificant correlations between this marker variable and the other model constructs gives evidence that common method variance is not a significant problem. Furthermore, Podsakoff et al. (2003) suggest that social desirability is one common source of common method bias in studies that use self-response methods. Therefore, social desirability was added to the research model with paths linking social desirability to process losses, conversation leveraging, and perceived productivity. It did not have significant relationships with any of these three variables, again suggesting that the relationships between model constructs cannot be accounted for by common method bias. Finally, one variable, media fit, was captured in another study, helping to reduce mono-method bias.

Figure 2 PLS Results



Note. Propensity for cognitive failures was included as a control variable.
$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Hypotheses 2, 5, and 8(a) were strongly supported, with experienced intensity, MC initiator, and MC preferences influencing process losses. These constructs, along with our control variable, propensity for cognitive failures, explain 32% of the variance in process losses. MC initiator together with MC preferences explains 13% of the variance in conversation leveraging—supporting H4 and H8(b). Hypotheses 6 and 7 were also supported, with conversation leveraging and process losses accounting for 24% of the variance in overall productivity. Hypothesis 8(c) was not supported because MC preferences did not relate to productivity.

To test the mediator relationships implied by our model, we used the Sobel test (Baron and Kenny 1986, MacKinnon et al. 2002, Sobel 1982), which was significant in all cases. Specifically, process losses mediate between MC experienced intensity and productivity ($-4.37, p < 0.001$) and between initiator and productivity ($-3.74, p < 0.001$); conversation leveraging mediates between initiator and productivity ($-2.70, p < 0.001$).

Moderator Analysis. To assess whether media fit moderates the relationship between experienced intensity and process losses, we used a multigroup (parametric) approach, a commonly used technique for assessing between-group differences in path coefficients within SEM (Qureshi and Compeau 2009). Before investigating the hypothesized group difference, Vandenberg and Lance (2000, p. 4) suggest that "the establishment of measurement invariance across groups is a logical prerequisite to conducting substantive cross-group comparisons." We tested for measurement invariance between the groups in two ways. First, we conducted separate factor analyses for each of the two groups. In both groups, all items loaded greater than 0.55 on their respective factors except one measure of pace and several measures of cognitive failures. These measures still loaded higher on their respective constructs than other constructs. All the Cronbach's alpha and composite reliabilities were greater than 0.80 except pace for the low fit group, which was 0.74. These results suggest that measurement invariance at the construct level was not a problem. We conducted further invariance analysis at the factor loading level (metric invariance; Vandenberg and Lance 2000) using a permutation-based procedure in XLStat (XLStat 2012). The permutation-based procedure is the same as is outlined by Chin and Dibbern (2010), but the permutations were also used to test the significance of the standardized loadings. The results demonstrated no significant differences in standardized factor loadings between the two groups for any items. In all, measurement invariance did not appear to be a problem.

Because PLS-Graph does not directly allow multigroup comparisons, we used XLStat version 2011.04.02 (XLStat 2012) to run multigroup *t*-tests to see if media fit moderates the relationship between experienced intensity and process losses. To test H3, we dropped the medium media fit group and ran the model twice to compare the high ($n = 45$) and low fit ($n = 218$) groups. As expected (see Appendix 7), the relationship between experienced intensity and process losses was strong when media fit was lower (beta $= 0.27$, $p < 0.001$) but weak when media fit was higher (beta $= -0.08$, $p = 0.49$). The multigroup *t*-tests show that this relationship was significantly different ($p = 0.01$). From the table we see that this relationship was the only one that was different between the two groups. Although the sample size in the high fit group is small, group size alone cannot explain this significant difference because other relationships in the high fit group were found to be significant (e.g., the relationship between cognitive failures and losses). We further tested the difference between the groups via the permutation procedure suggested by Chin and Dibbern (2010) using XLStat and found that the relationship between experienced intensity and losses was the only one significantly different ($p = 0.02$). Because the medium fit group had been dropped at the beginning of this analysis, we added it back in and examined the relationship between experienced intensity and losses for the three groups (high, medium, and low fit). High media fit was significantly different from both low fit and medium fit groups, and the medium and low fit groups were not different from each other (see online Appendix 7). This suggests that it is the characteristics of high fit that allow focal individuals to dampen the negative process losses associated with high intensity MC episodes. These analyses suggest that MC fit moderates the relationship between experienced intensity and process losses, supporting H3.

In general, our model was supported. All hypotheses were supported at the $p < 0.01$ level or lower except for segmentation of social roles, which was not supported as a formative dimension of intensity (H1(c)), and the relationship between MC preferences and productivity (H8(c)) was insignificant.

Discussion

Most model hypotheses were supported. In terms of MC intensity, the pace of switching, topic complexity, and differences in topics were significant dimensions. However, segmentation of social roles was not (post hoc tests revealed that social roles were also unrelated to any of the mediating or outcome variables). One possible explanation may be that the type of social role is more important than the segmentation between social roles. For example, texting one's boss at the same time as engaging in a conversation with the company's CEO may be considered low social role segmentation (both are communicating with higher ranking work individuals), but instead of the low role segmentation reducing intensity, one might expect that such an MC episode would be very demanding and intense. Thus, the exact social roles enacted and the complexity or demands implied by these social roles may be more important than the segmentation between them.

The relationship between the more objective (measured formatively) and the experienced (measured reflectively) versions of MC intensity was moderately strong (0.67). This represents a good first attempt to quantify this complex measure, especially considering we did not include the number of overlapping conversations dimension. Future research should determine if there are other dimensions of MC intensity.

Those who experienced higher intensity MC episodes also reported more process losses. The process losses in the current study were designed to be reflective indicators, assumed to result from cognitive overload encountered during the episode. Future research examining process losses in different contexts or at different levels of analysis could consider treating these indicators as formative. For example, a problematic connection during a conversation on Skype may lead an individual to miss a comment made by the other person but may not cause her to lose her train of thought. Whether or not process losses should be modeled as formative or reflective depends on "the generality or specificity of one's theoretical interest" (MacKenzie et al. 2005, p. 713).

The initiator of the MC episode emerged as an important construct, influencing both process losses and the gain of conversation leveraging. Focal individuals who initiated the second conversation generally experienced fewer errors, confusion, repetition, etc. Two mechanisms may be creating this effect. First, process losses may be reduced because focal individuals only choose to initiate a second conversation when they think that they can handle the demands of an additional conversation. Thus, they may actively avoid MC if they think it will lead to too many errors, confusion, etc. Second, as described earlier, the psychological mechanism perception of control is known to result in decreased stress and increased performance (e.g., Dollard et al. 2000). Thus, the focal individual's increased perception of control that comes with self-initiated MC may be leading to fewer process losses. Focal-initiated MC episodes are preferable to other-initiated episodes when considering the focal individual's perspective.

Conversation leveraging was more likely when the second conversation was focal initiated. Post hoc analyses revealed some examples of conversation

leveraging when the episode was other initiated. This suggests that serendipity can sometimes occur while MC—the focal individual receiving a call or message from a partner who just happens to have information needed for the first conversation.

Results demonstrate that process losses decrease whereas the gain of conversation leveraging increases productivity (even when controlling for social desirability), supporting Steiner's theory regarding productivity (1972). Although a general assumption may be that doing two things at the same time improves productivity, the data suggest that the focal individual's productivity will actually deteriorate to the extent that process losses are experienced. Although conversation leveraging did improve productivity, the relationship was not particularly strong, suggesting that other gains related to MC may exist and should be studied. Future research should also consider the effects on the productivity of those other than the focal individual, whether conversation leveraging improves the productivity of the communication partner or overall group productivity (in the case of an instant message during a conference call).

Individual characteristics emerged as important constructs influencing two of the model's variables. Specifically, focal individuals' multitasking abilities (the control variable of propensity for cognitive failures) related strongly to process losses. Further, respondents' multicommunicating preferences (their polychronic communication orientations) acted as a lens through which they judged their task process losses and the conversational leveraging of their multicommunicating episodes.

As hypothesized, media fit moderated the relationship between experienced MC intensity and process losses: when media fit is low, an increase in intensity increases process losses, but when media fit is high, an increase in intensity does not increase process losses. This suggests that media sets that have complementary capabilities allow us to mitigate the damage during these episodes or reduce the cognitive demands so that we avoid the costs of cognitive overload. The delayability, revisability, and reviewability offered by text-based media such as instant messaging, combined with the reduced cues of nonvisual media, allow us to better manage multiple conversations, even when they are high in intensity. There was no significant direct relationship between media fit and losses (see online Appendix 6) suggesting that using compatible media only reduces process losses during high intensity episodes. Further, it is the *set* of media that is important. Therefore, although newer devices such as smart phones may make MC easier, whether or not they result in process losses depends on the medium with which they are paired.

These findings demonstrate the usefulness of the media fit construct. However, this new construct requires study within a more complete conceptual and nomological net. The MIS literature has examined fit extensively through the notion of task-technology-individual fit (e.g., Goodhue and Thompson 1995, Dennis et al. 2001), but applications of this theory generally focus on the use of one technology at one point in time to support one task (for an exception, see Dennis et al. 2008). Thus, when studying fit from an MC perspective, theoretical extensions are needed to take into account the multiple tasks/conversations, multiple technology/media, and multiple individuals involved in one episode. The present study offers one step in this direction, examining medium-to-medium fit and its influence on the outcomes of the MC episode. Future research should examine the other dimensions of overall MC fit.

Implications and Conclusions

Multicommunicating in the workplace has become a way of life, with some people touting its benefits and others its costs (Lohr 2007). Using survey data from a variety of sectors and contexts, the present research represents one of the first empirical examinations of this phenomenon at work. This work responds to calls to investigate the interruptive nature of technologies (Davis 2002, Zweig and Webster 2002), the features of technology along with the contexts in which they are used (Fulk and Gould 2009), the effects of MC preferences (Turner and Reinsch 2007) and task complexity (Heninger et al. 2006), and the management and consequences of overlapping conversations in the workplace (Reinsch et al. 2008). In doing so, we drew on existing theorizing on MC (Reinsch et al. 2008), the sender versus receiver perspective (Straub and Karahanna 1998), and fit (Dennis et al. 2001, Goodhue and Thompson 1995) and complemented these with real-world examples to develop and test a model of the production-related outcomes of MC for the focal individual.

Our work provides significant theoretical contributions. We extend Reinsch et al. (2008) theorizing on MC by incorporating MIS research on fit in order to add the media fit construct. We also extend their model to consider the sender versus receiver perspective (Straub and Karahanna 1998), highlighting the importance of whether the MC was self-initiated or forced upon the individual. We further refine the work of Reinsch et al. (2008) by examining specific process losses and one process gain of MC and offering new insights into the various dimensions of intensity. This work demonstrates the need for new or extended IS theories of fit that consider the overlapping and complex use of technologies in today's organizations. As described earlier, fit is a widely used term, but its "precise nature and meaning are rarely stated" (Joyce et al. 1982, as cited in Zigurs

and Buckland 1998, p. 322). Our work goes one step toward filling this gap by offering media fit as one dimension of a multidimensional overall MC fit construct, which would take into account the overall fit of the multiple media, conversations, and individuals. This research also develops several new scales that measure the dimensions of objective MC intensity as well as experienced MC intensity.

Our study investigating MC from the perspective of the focal individual extends past research focusing on the partner's perspective (Cameron and Webster 2011). Considering the results from both perspectives gives rise to several paradoxes. For example, although focal-initiated MC is associated with lower process losses than is partner-initiated MC, the partner perceives the focal individual as more uncivil (because the focal individual is asking for the time and attention of the partner but not giving full attention in return). Further, although media fit can dampen the intensity-process loss relationship, partners' perceptions of incivility may still exist when the focal individual is able to hide the second conversation through the use of certain sets of media (because the partners have no explanation for the focal individual's lack of attention). Comparing our focal individual results to those from the partner's perspective demonstrates the need for future research to examine both perspectives simultaneously and to determine what tradeoffs should be made when an outcome is beneficial to the focal individual but detrimental to the partner.

Practical Implications. Although the popular press often argues that multitasking is detrimental to performance and should be avoided (e.g., Lohr 2007, Santosus 2003), MC may result in increased availability to others (Cameron and Webster 2011, Turner and Reinsch 2007). Further, because MC may be unavoidable in today's high-pressure business world with increasing reliance on virtual work, knowing how to minimize the negative and capitalize on the positive outcomes of MC will be useful to employees and their managers as well as technology specialists who train users on how to most effectively use emerging technologies.

Organizations may want to train their employees to limit the pace of switching and the complexity of conversation topics during MC. This may be especially important in jobs or industries where process losses such as errors and confusion are particularly dangerous or costly. Employees should also be trained to choose communication channels that fit best for MC—specifically, both with invisibility and at least one with delayability, reviewability, and revisability. Employees should be trained to consider both media when MC—for example, instant messaging should not be chosen for MC without first reflecting on the other medium with which it will be paired.

From the focal individual's perspective, self-initiated are preferable to other-initiated episodes. However, other-initiated MC may be important for those in the service industry where responsiveness to the customer is a top priority or for those whose jobs involve front-line contact with clients. Organizations should examine each position's communication requirements and if their employees' jobs require them to be available anytime/anywhere. For example, research occupations may not require constant availability whereas a marketing firm's account managers may need to be readily available to their clients. To avoid the performance problems of other-initiated MC, organizations should discourage expectations of constant availability for positions where the contact with external or internal clients does not warrant it. Positions that require the employees to be constantly available should be examined—focusing on process gains and losses—to determine how to structure the media and communications to maximize productivity.[17] Finally, training on technologies that facilitate multitasking and MC should emphasize that doing two things at the same time may not increase overall productivity if doing so results in errors. Although seemingly obvious, trainers should reiterate this point: because people tend to overestimate their multitasking abilities (Pashler 1994), employees may assume that they do not make errors while MC.

Strengths and Limitations. Although numerous contributions of this work are highlighted above, some limitations should be noted. One limitation concerns possible retrospective bias. Respondents were asked to recall a previous MC episode, and retrospective accounts can allow the passage of time to influence one's perceptions of events (Golden 1992). To minimize this bias, respondents were instructed to recall their *most recent* MC episode; more than 78% of respondents reported on an episode that had occurred within the previous week. Further, the length of time between when the episode actually occurred and respondents' reporting on that episode was not significantly related to any of the dependent variables. Because we asked respondents to report on recent episodes, our findings may be biased toward those who engage in MC often enough to have a recent incident to report as well as toward those media pairs that are used most frequently for MC.

Other potential issues, such as ordering effects, common method bias, and determining causality, are possible. However, recommendations for the separation and ordering of construct scales were followed (Lindell and Whitney 2001, Podsakoff et al. 2003), one measure was obtained using a different method (media fit from a previous study), and substantial

[17] We thank an anonymous reviewer for this idea.

efforts were made to assess the impact of common method bias, suggesting that these issues did not account for the findings.

Focal individuals' *perceptions* of their own productivity were measured in the current research, and individuals' perceptions of their own performance during multitasking are not always accurate (Pashler 1994). However, disparity between actual and perceived productivity may be less of a problem in MC because it is a social activity and the reaction of partners may allow for immediate performance feedback that is not usually present in nonsocial multitasking situations. Nevertheless, relationships that involve focal individual productivity should be reexamined in future research using a more objective measure.

There are also several strengths of this research. First, all of the hypotheses (except for two subhypotheses) that were developed based on the Reinsch et al. (2008) model and our theoretical extensions were confirmed in our survey. In addition, we collected data from employees from a variety of sectors and backgrounds, increasing the generalizability of the results. Finally, the use of literature and data-grounded scale items, the pilot studies, and the card sorts makes it difficult to attribute nonsignificant or unexpected results to measurement error and increases the validity of the research results.

Future Research. Whereas the limitations outlined above represent opportunities for future MC research, other opportunities are also present. We have two additional suggestions concerning the dimensions of MC intensity. First, we assumed in our study that each respondent held one social role in each conversation and that each conversation involved only one task. Research should examine MC in which there are multiple roles and multiple tasks per conversation. Second, differences in topics should be further examined because some differences may enhance, whereas others may degrade, performance. For example, Wickens (1991, p. 23) suggests that cooperation similarity occurs when task performance is enhanced because of "a common mental set, processing routine, or timing mechanism." In contrast, confusion similarity occurs when the processes relevant for one task get incorrectly "activated by stimuli for a different task, producing confusion or cross-talk between the two" (Wickens 1991, p. 24; also suggested in Gillie and Broadbent 1989, Navon and Miller 1987, Pashler 1994). Our measure of differences in topics was not detailed enough to capture this distinction, which should be examined in future research.[18]

In the current study, we examined the influence of media fit; however, as described above, a more complete examination of overall MC fit should take into account the multiple tasks/conversations, technologies/media, and individuals' characteristics that may be important to MC. Thus, our work demonstrates the need to extend IS theories of fit to consider the overlapping and complex use of technologies as well as the current many-to-many relationships between users and their technologies.

Future work should explore employees' coping strategies when faced with partner-initiated MC. Lazarus and Folkman's (1984) work on emotion- and problem-focused coping has been used in other IS research (e.g., Beaudry and Pinsonneault 2005) and could be applied to MC. Research should also examine if the possible benefits of serendipity outweigh the additional process losses experienced for other-initiated MC episodes. More generally, although our research focused more on process losses than on gains, future research should investigate other gains in addition to conversation leveraging, such as more efficient discussions and more creative solutions (Turner and Reinsch 2007).

Future research should also examine the effects of norms. An organization may have norms that encourage or limit MC, perhaps influencing the frequency of MC as well as the variety of contexts in which it occurs. Other research opportunities include studying the influence of employees' jobs and industries. Some jobs, such as knowledge workers and emergency room staff, may be more prone to MC.[19]

Although there are strengths to the survey methodology employed in this research, other methods may be instrumental in capturing the complexities inherent in MC. Experimental methodologies could be used to further test our variance model. In addition, because MC involves choice, management, and switching between multiple conversations, this area would benefit from the development of process models. They may require other methods to capture MC that occurs "in the wild"—such as Oulasvirta's (2005) study of the use of mobile devices in urban settings with individuals on the street.

Conclusion. Multicommunicating has arisen as a result of today's environment of virtual work supported by multiple technologies. In general, existing multitasking research does not speak to the management of multiple conversations, media, or partners at the same time. Likewise, CMC research does not address the complexities that employees face in managing their many-to-many relationships with technologies or how employees can best use media combinations to optimize performance. The present research draws on and extends the Reinsch et al. (2008) theorizing on MC to further reflect the contextual factors that are important for developing a fuller

[18] We thank an anonymous reviewer for this idea.

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understanding of this phenomenon. Our work also helps to fill past gaps by introducing the notion of media fit and by offering suggestions for those engaging in MC. In today's high-pressure business world where MC may be unavoidable, a paradigm shift is required to move beyond studying one technology in isolation toward investigating multiple technologies that may affect users and their networks of contacts over time.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/isre.1120.0446.

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