Consequences of IM on Presence Awareness and Interruptions

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INTRODUCTION

Technology has changed the way we communicate in the workplace; new and improved computer-mediated communication tools are available for our use, and media choice has become an issue (Cameron & Webster, 2005). Nowadays it is hard to decide what communication tool to use or how we convey messages when using certain media (Trevino, Daft, & Lengel, 1990).

Instant messaging (IM) is a computer-mediated tool that is used to send and receive text messages in a synchronous manner using the Internet. IM has become a common channel of communication between family members and friends (Goldsborough, 2001); almost 53 million adult Americans trade instant messages, and 24% of them swap IM more frequently than e-mail (Shiu & Lenhart, 2004). After seeing this tool's usefulness, managers are beginning to introduce it in the workplace as an informal way to communicate; at the same time, IM seems to bring unintended (though not necessarily negative) consequences like presence awareness (Cameron & Webster, 2005) and interruptions (Rennecker & Godwin, 2005).

Various theoretical frameworks have been used to study IM, mostly in the fields of communications and electronic monitoring (Cameron & Webster, 2005), many of which utilize qualitative methods. Very few empirical studies are published in this area, and those available are written by IM vendors or IM developers using colleagues as their main subjects of study (Cameron & Webster, 2005).

This article studies IM's effects on interruptions and presence awareness, as well as the effect presence awareness has on interruptions. For the statistical analysis a subset of 111 elements of the February 2004 PEW Internet and American Life surveys dataset was used as a sample. PLS Graph software was used to create the structural model and test the relationships between the constructs Interruptions (INT), Presence Awareness (AWA), and use of IM in the workplace (IMW).

BACKGROUND AND HYPOTHESES

The main tool used by managers to do their work is communication. Theories in the communications field suggest that media is as important as the conveyance of the message (Trevino et al., 1990). In other words, the content of the message is as important as the medium used to deliver it. The Symbolic Interactionist perspective has been utilized to explain symbolic cues conveyed by different media; for example, an official e-mail may imply formality while the use of IM may convey urgency but informality (Trevino et al., 1990).

Presence awareness is the ability to see who is online at specific times. Most IM systems display a list of users connected to the network (or Internet, depending on the IM software). This list helps conversation initiators judge if recipients are available for conversation (Nardi, Whittaker, & Bradner, 2000); most IM systems are able to post an "away" or "busy" message to let others know the IM user's status, reducing at the same time the interruption level by allowing recipients to negotiate availability. To compensate for privacy concerns, IM systems are also capable of blocking users from the list in order to "hide" from them; this gives the user complete control over who sees him/her as "online" (Cameron & Webster, 2005). IM users sometimes send short messages (e.g., "hello?") to initiate a conversation, and it is up to the recipient to either answer or wait for a more appropriate time. Privacy concerns are important for people, and even though presence awareness can be considered invasive, most users found the IM monitoring system less invasive than video cameras (Zweig & Webster, 2002).

Another important factor in presence awareness is the sense of social connection; experiencing connection with other people makes users feel socially engaged and gives them the confidence to know that somebody is available (Nardi et al., 2000). In general, presence awareness is an IM consequence that both the initiator and the recipient can see as beneficial because it gives

both the ability to consent communication without the hassle of face-to-face negotiation. From the previous discussion, the following hypothesis can be inferred:

- ***H1:*** The use of IM in the workplace will have a positive effect on presence awareness.

O'Conaill and Frohlich (1995) define interruption as "a synchronous interaction which is not initiated by the recipient, is unscheduled, and results in the recipient discontinuing their current activity" (p. 262). Interruption does not necessarily mean disruption, but even the notification of an incoming message can cause interruption, which may or may not negatively affect performance (Cutrell, Czerwinski, & Horvitz, 2001). It has been hypothesized that interruptions derail the flow of activities directed toward accomplishing a task and delays can contribute to work disorganization when a worker is unable to move forward with a task due to insufficient information (Rennecker & Godwin, 2005). Consequently one can expect users, especially recipients, to perceive IM as interruptive. This leads to a second hypothesis:

- ***H2:*** The use of IM in the workplace will have a positive effect on interruptions.

Managers introduce the use of IM in the workplace as means to communicate; even though IM is considered informal, the sense of urgency has made IM the medium of choice when information is needed to complete a task (Nardi et al., 2000). One way in which a task can be delayed is by not having the information needed; a common way to obtain this information from a co-worker or supervisor is to contact the person using either an asynchronous medium (e.g., e-mail) or a synchronous medium (face-to-face, telephone, IM) and each communication method would have its own advantages and disadvantages. With the former method, more delay can be experienced because of the nature of the medium. If the latter method is used and if the recipient is available, a faster response can be guaranteed (Rennecker & Godwin, 2005). IM is a method of choice because thanks to the presence awareness, a negotiation is possible between the initiator and the respondent. First, by taking a quick look at the "online" list a person can tell if a user is available; second, from the status on the list, one can determine if the user is "busy" or "away"; and third, a quick "are you there?" message can ensure that the user is available and ready to communicate (Nardi et al., 2000). This discussion leads to a third hypothesis:

- ***H3:*** Presence awareness will have no effect on interruptions

Since the hypotheses refer to a set of causal links involving three constructs, a representation can be provided in the form of a structural model (see Figure 1).

RESEARCH METHOD

The method employed for data analysis in this study was partial least squares (PLS), an alternative structural equation modeling technique (Chin, 1998). PLS was implemented through the PLS-Graph software V.03.00 (Chin, Marcolin, & Newsted, 1996; Chin, 1998). A sub-

Figure 1. Hypothetical model and hypotheses

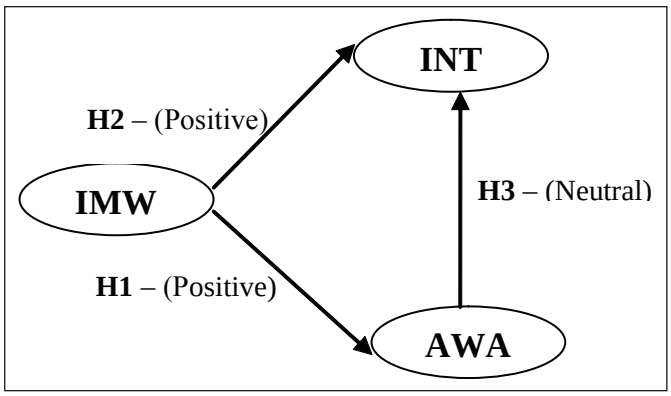


Table 1. Item loadings per construct

Construct	Item	Item loading
Interruption	INT1	0.7617
	INT2	0.8930
	INT3	0.8041
Presence Awareness	AWA1	0.7974
	AWA2	0.7989

Table 2. Reliability, convergent, and discriminant validity coefficients

	CR	AVE	INT	AWA
INT	0.861	0.675	**0.822**	
AWA	0.778	0.637	0.167	**0.798**

CR- Composite Reliability; AVE – Average Variance Extracted

Diagonal elements are the square root of AVE. Off diagonal element is the correlation between constructs.

set of 111 elements of the February 2004 PEW Internet and American Life surveys (http://www.pewinternet.org) dataset was used as a sample for the statistical analysis; this subset contained only respondents who acknowledge using IM in the workplace. This PEW Internet and American Life Project dataset was gathered through telephone interviews conducted by Princeton Survey Research Associates between February 3 and March 1 of 2004, from a sample of 2,204 adults, aged 18 and older.

The measurement model in PLS is assessed in terms of item loadings and reliability coefficients as well as the convergent and discriminant validity. Individual item loadings on each construct, greater than 0.7, are considered as adequate values (Fornell & Larcker, 1981). Reliability is measured through the composite reliability estimate, and a value of 0.7 or greater for each construct is considered acceptable. To justify using a construct (convergent validity), the average variance extracted (AVE) can also be used as a measure of reliability, and for a construct to be used, AVE should be greater that 0.5 (Fornell & Larcker, 1981). A satisfying level of discriminant validity is achieved when the square root of the AVE for a particular construct is larger than the correlations of the other constructs (Fornell & Larcker, 1981).

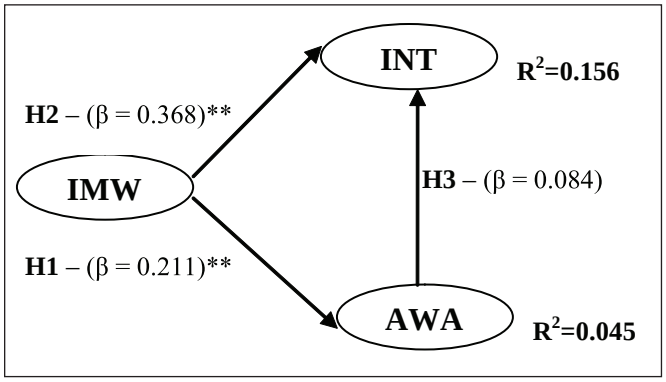
In Table 1, we can observe the loadings of each item for each construct. All items have a value greater than 0.7, making them suitable for use on each construct. Table 2 shows composite reliability, AVE, and correlations among constructs. Satisfying levels of convergent and discriminant validity can be observed for the presented reflective measurement model.

RESULTS

In PLS, the structural model is assessed by examining the path coefficients (standardized betas [β]), T statistics, and the R square (R^2) to indicate the overall predictive strength of the model. Figure 2 illustrates the structural model with the results of the PLS analysis, showing partial correlations (betas [β]) and R squares (R^2) or explained variance. Betas (β) followed by two asterisks were significant at $P < 0.01$ in a one-tailed T-test; Betas (β) not followed by an asterisk were non-significant. The $P < 0.05$ can be seen as the upper threshold of acceptability (Rosenthal & Rosnow, 1991). T values were calculated using the bootstrapping method.

From Figure 2, we can observe that the use of IM in the workplace (IMW) had a positive significant effect on interruptions (INT), which provides support

Figure 2. Results of the PLS analysis



for hypothesis H2. In the same figure, we notice how the use of IM in the workplace (IMW) had positive significant effect on presence awareness (AWA), which also offers support for hypothesis H1. Additionally, Figure 2 suggests that presence awareness (AWA) had no significant effect on interruptions (INT), which in turn supports the last hypothesis H3.

Finally, Figure 2 also implies that the relationship described in the structural model accounts for approximately 16% of the variance in the interruptions (INT) construct and 5% of the variance in the presence awareness (AWA) construct.

DISCUSSION AND CONCLUSION

Recently, the use of IM has increased in the workplace; managers are introducing it as an informal synchronous communication tool, but at the same time unintended consequences, either positive or negative, can emerge from its use including interruptions and presence awareness. This study attempts to examine them according to the literature reviewed.

The findings in this paper are consistent with the presented hypotheses. Of special interest is that interruptions are directly and significantly affected by IM but not by presence awareness; in other words presence awareness is acting as a filter for interruptions. Presumably, the many features IM has to show users, like the status of the recipient (if he is "away" or "busy"), help in the negotiation of the interaction between parties. Another interesting result is how IM users find presence awareness useful and not intrusive, but instead use it to their advantage. In fact, awareness can be seen from two different perspectives: the initiator and the recipient. When seen from the initiator's point of view, the results of this study become more obvious because the initiator is looking for information, and presence awareness can give that person a panoramic view of everybody who is online and available to answer questions or engage in conversation. Seen from the recipient's perspective, maybe the inquiry could be interruptive at first, but the IM user has the ability to negotiate and not answer the first request or use the "busy" or "away" feature of the IM software. This in turn helps initiators and recipients deal with privacy concerns; most IM software has the "block" function to completely hide the user from unwanted or unsolicited interaction.

One of the biggest limitations of this study was the dataset used for the PLS analysis. Since secondary data was used, the analysis was confined to the number and type of variables available in the set. A replication of this study with primary data could make a greater contribution to the very thin collection of scholarly empirical papers in this field. Additionally, the inclusion of some other variables of interest like achieved efficiency, effectiveness, multitasking, delays, and so forth will allow a more robust study.

Finally, while only some of the variables were measured in connection with IM and its uses in the workplace, interesting findings were revealed. A theoretical framework should be constructed through a more comprehensive study to explicitly and empirically measure IM, its components, and its effects.

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KEY TERMS

Asynchronous Medium: A communications medium that does not requires that both parties are present at the same time in the same space (for example: e-mail).

Initiator: The IM user that begins the communication request.

Instant Messaging (IM): A computer-mediated tool that is used to send and receive text messages in a synchronous manner using the Internet.

Interruption: A synchronous interaction that is not initiated by the recipient, is unscheduled, and results in the recipient discontinuing their current activity.

Presence Awareness: The ability to see who is online at specific times. Most IM systems display a list of users connected to the network using the IM system.

Recipient: The IM user that receives the communication request.

Symbolic Interactionist Perspective: A theory used to explain symbolic cues conveyed by different communication media.

Synchronous Medium: A communications medium that requires that both parties are present at the same time in the same space (for example: face-to-face or telephone).