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# Incidental Information Exchange: A Measure for Assessing the Affect of Mediated Communication on Work Relationships

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## ABSTRACT

This paper proposes a relatively quick method, called incidental information exchange (IIE), for capturing the level of social exchanges which take place within a workgroup. The measure captures the incidental knowledge that co-workers have about each other's daily life. It is argued that this mutual knowledge sharing is a necessary step in building work relationships. A pilot study was conducted to assess the application of this measure to a workgroup that has had desktop videoconferencing installed in its offices to connect them with another workgroup located in another city. The administration of the measure was then presented to test its validity and reliability.

## Keywords

Desktop videoconferencing, work communication measure, information sharing, self-disclosure, work relationship development

## INTRODUCTION

Media richness theory (e.g., Daft, Lengel and Trevino, 1987) and social presence theory (e.g., Short, Williams and Christie, 1976) suggest that computer-mediated communication (CMC) cannot effectively convey relational cues and personal affections, which are important for interpersonal relationship development. Newer technologies involving the use of video at the desktop coupled with groupware that permits work-sharing and control of the video environment are being investigated to determine if the added richness of these mechanisms improve workplace interpersonal communication. These computer managed video connections are often called media spaces (Bly, et al, 1993, Mantei, et al, 1991). Whether media spaces support the building and maintenance of work relationships over time is of particular interest in the evaluation of media spaces and other information technology designed to support work at a distance.

One of the key elements that have been found important in building relationships with another individual is interpersonal self-disclosure (Gabarro, 1978, 1992; Steel, 1991; Trandis, 1977), i.e., the sharing of personal information with another colleague. In a co-located environment, self-disclosure can be obtained implicitly as well as explicitly by observation of other co-workers. It is also obtained through communication exchanges in ad hoc contacts, joint work sessions and meetings (Gabarro, 1992). The argument for installing a media space is that it will provide similar possibilities for self-disclosure and thus provide the necessary albeit not sufficient condition for relationship buildings to take place.

In social psychology research, measures have been developed to capture self-disclosure through self-report of likelihood of self-disclosure, but to which degree they reflect actual self-disclosure behavior is questioned (Jourard, 1971; Wheelles and Grotz, 1977). Actual behavioral measures were developed for a study of online self-disclosure (Joinson, 2001) but are not applicable to workplace communication. Other studies have looked at the relationship building supported by CMC that involve detailed interviews or observations, transaction logging or extensive videotaping of work communication (e.g., Jarvenpaa and Leinder, 1995, Walther, 1995). This paper proposes a new mechanism which captures the actual knowledge sharing and which is also relatively simple to execute. It is called the IIE or incidental information exchange measure. It captures the shared knowledge that co-workers have of their co-workers in exploring the formation and development of work relationship. The approach of this paper is to apply this measure in a longitudinal study to ascertain if the communication

media introduced could facilitate the level of interpersonal self-disclosure necessary for relationship formation and development. This gives an assessment of the effectiveness of the media for providing the necessary environment for developing work relationships.

In the pages which follow, first what is known about how work relationships are formed and maintained and key dimensions that characterize their formation are presented. Work and social relationships are distinguished. Following this discussion, the IIE measure is presented and issues about its validity and reliability are discussed. An administration of the measure inside a company which installed desktop videoconferencing between two workgroups located in different cities is then described. The results using IIE are compared with users interview results and other studies that look at gender and collocation to assess the reliability and validity of the instrument.

Finally, the limitations of the pilot study are explained and unresolved issues that this study has raised are discussed, e.g., further refinement of the IIE instrument through classification of the shared information items and through more testing on larger subject populations. A recommendation for more work in this area is then presented.

## **RELATIONSHIP OF INCIDENTAL INFORMATION SHARING TO WORK RELATIONSHIP**

Studies of social relationship formation note that such relationships develop along a variety of dimensions. The most frequently cited dimensions of importance are openness and self-disclosure, knowledge of each other and the ability to predict each other's reactions and responses (Altman and Taylor 1973, Jourard 1971, Triandis 1977). There is considerable overlap in these elements as mutual self-disclosure leads to knowledge of each other, and the knowledge leads to ease and efficiency of communication and the ability to predict the other's responses. The development of work organizations is a form of social structure and much of what constitutes a work relationship is the same as that which forms a social relationship. Openness and self-disclosure is of the same critical importance in developing mutual knowledge and hence trust in work relationships as in social relationships (Gabarro, 1992).

Gabarro (1992) proposes that when co-workers begin to establish a work relationship, they begin with an orientation phase in which they engage in a formal mutual exchange in which they size up the other person's openness, competence and reliability. This proceeds to a second stage in which individuals explore more details about each other's expectations and how safe the co-worker is for self-disclosure. These early stages of negotiation involve individual expression of personality variables such as interests, general opinions on items, etc. Such information exchange enables assessment about others and reinforces interpersonal similarity and familiarity. This is an important predictor of work group formations as people strive for predictability by choosing future group members based on similarity, competence and familiarity (Hinds et al. 2000).

After work relationship is initiated, it needs to evolve into a stable and robust relationship through continuous interpersonal self-disclosure (Gabarro, 1992). Jarvenpaa and Leidner (1999) confirmed this in their study of global virtual teams in which they found that virtual teams exchanged social information throughout a project to maintain team rapport and trust. Maznesvski and Chudoba (2000) also found that high-cohesion teams structure their social interaction around periodic face-to-face meetings.

Proximity is an important element in the workplace for fostering social knowledge sharing as it allows self-disclosure to take place by offering a channel for spontaneous, interactive and efficient communication (Kraut, Fish, Root and Chalfonte, 1990; Root, 1988). Kraut, Edigo and Gallegher (1990) demonstrated this in their study of scientific collaboration where they showed that the strongest predictor of scientific collaboration on papers was distance and distance is inversely correlated with collaboration.

However, Gabarro (1978, 1992) also points out that too much personal self-disclosure may hurt rather than help motivation, coordination and successful work relationships. Effective work exchange does not involve items of a deeply personal nature but does involve items which characterize and define each other's personality so that assessments can be made. This study calls this type of exchange incidental information sharing. It can contain such details as social status, e.g. married or single, outside interests, e.g., movies, baseball games or concerts. It can also contain details about minor perturbations in someone's lifestyle, e.g., car breakdowns or the celebration of an important event. Some of these exchanges are non-verbal such as the array of pictures of one's children on a desktop or the taping of a favorite cartoon to the office door.

The above discussion on work relationship development is summarized as this: co-location fosters incidental information sharing which can lead to the development of trust and a work relationship. If a communication medium is introduced to

replace co-location, the level of incidental information sharing after the introduction can be determined to measure the effectiveness of the medium in developing and maintaining work relationships.

**THE IIE INSTRUMENT**

The IIE instrument assesses what incidental information co-workers know about the day-to-day life of compatriots. To use this instrument, first, a structured interview is conducted on all co-workers, asking for general information about family, personal, interests, transport, lunch activities, and also recent unique incidents that occurred to each of them. The types of questions that are asked in this structured interview are shown in table 1. From each category of interview, a factual statement is formed about each person in the study. If an interview category does not have information for all respondents, it is dropped from use. The factual statements take the form of a true statement about the person, e.g., “recently bought a new dog named Sammy”. Ten factual statements are written for each person interviewed. This list of facts is then checked with the respondent to verify that the facts are, indeed, correct statements about the person.

<b>I. Family and personal history</b>			
1. Have you lived in Toronto/Waterloo all your life?		Yes	No
2. Have you lived in any other places?		Yes	No
Place	When? (optional)		
3. Is there anything special or unique about the neighborhood you live in?		Yes	No
What’s special?			
4. Do you have children?		Yes	No
If No, go to next section			
Name	Age	Name	Age
5. If so, did any of them do something special in school this past term?		Yes	No
Child	Special thing in past term		
6. Do any of them have special plans for the summer?		Yes	No
Child	Plans		
7. Did they do something special of amusing in the last week?		Yes	No
Child	Special thing in last week		
<b>II. Personal</b>			
1. Did you have a significant event last month, e.g. birthday, anniversary?		Yes	No
Event	Details		
2. Did you buy anything special last month?		Yes	No
Purchase	Details		
3. Do you speak any languages other than English?		Yes	No
Language			
4. Did you attend any parties or barbeques in the past month?		Yes	No
Party	Occasion		
5. Did you attend a play, a concert, or a sports event this month?		Yes	No
Event attended	Enjoyed?		
6. Do you have any pets?		Yes	No
Animal	Name		

<b>III. Leisure</b>		
1. What are your interests outside of work (e.g. music, sports)? Interests                      Details	Yes	No
2. Are you a sports fan? If no, skip to question 4. Sport	Yes	No
3. What teams do you root for? Team		
4. Have you taken a vacation in the last year? Place                      When	Yes	No
5. Did you watch anything interesting on television this week? Program                      When	Yes	No
6. What is your favorite TV series? Favorite TV series	Yes	No
7. Have you seen any movies recently? Movie                      Opinion	Yes	No
<b>IV. Transport</b>		
1. Do you have a long way to travel to get to work? Travel Time	Yes	No
2. How do you get to work, e.g. bike, walk, car, transit? Mode of transport		
3. Did anything unusual happen to you on the way to work this week? Unusual occurrence	Yes	No
<b>V. Lunch</b>		
1. What do you generally do for lunch? Bring                      Buy                      Don't eat		
2. What do you typically eat for lunch? Food		
3. Where would you go for a special lunch? Restaurant		
<b>VI. Workspace</b>		
1. Describe any artifacts of interest in your workspace (e.g. paintings, posters, objects d'art, humorous cartoons, etc.)? Object                      Details	Yes	No
2. Do you have plants on or by your desk? Plant	Yes	No
3. Are there any photographs on your desk? Photo                      of whom?	Yes	No
4. Do you have a bulletin board?	Yes	No
<b>VII. Past work week</b>		
1. Did you have any problems with any office equipment this week? Equipment                      problem	Yes	No
2. Did you travel as part of you job this week? Place                      purpose	Yes	No

**Table 1. Interview questions**

Finally all statements are randomized and put on a single form on which individuals are asked to match each statement with a co-worker. This form is then given to each co-worker at the study site and they are asked to make the matches. Each person is also asked to indicate whether they “guessed” what the match was or actually knew. In scoring subjects responses, one point is assigned to each correct match. A high score on a particular co-worker means that the person filling in the matching form knows many incidental details about the life of that co-worker. These scores, thus, capture the level of incidental information exchange that happens among the co-workers. Sample questions in the IIE instrument used in this pilot study are selected and shown in table 2.

Circle the name of person the statement refers to									
1. World cup soccer fan	Don't know	A	B	J	M	P	R2	R	V
2. Recently visited Phoenix, Arizona	Don't know	A	B	J	M	P	R2	R	V
3. Printer wouldn't print correct fonts recently	Don't know	A	B	J	M	P	R2	R	V
4. Lives in Unionville	Don't know	A	B	J	M	P	R2	R	V
5. Worked in Winnipeg	Don't know	A	B	J	M	P	R2	R	V
7. Has a ceramic piggy bank of a face on desk	Don't know	A	B	J	M	P	R2	R	V
8. Went to Graduate school in Israel	Don't know	A	B	J	M	P	R2	R	V
9. Was born in Italy	Don't know	A	B	J	M	P	R2	R	V
10. Recently took a course in multimedia	Don't know	A	B	J	M	P	R2	R	V
11. Children are taking tennis lessons this summer	Don't know	A	B	J	M	P	R2	R	V
13. Bought a house this year close to work	Don't know	A	B	J	M	P	R2	R	V

**Table 2. Sample instrument questions**

## DESCRIPTION OF THE IIE STUDY

A pilot study was conducted on the use of IIE instrument in a small government-university liaison organization. The purpose of the organization was to build relationships between industry and the various departments of two highly technical universities that were located in the state. The two universities were located in cities that were approximately 100 miles apart. For the purposes of describing this study, they are called City X and City Y. The company's office located in City X was the main office and dealt with the larger university. It had six people on its staff. The office in City Y was the satellite office that had 2 full-time members on its staff and 1 part-time member.

Since much of the work that was done by the organization involved both universities at all times, a large amount of communication traffic occurred between both offices. This included telephone conversations and a large amount of emails plus weekly staff meetings where the Director from City Y traveled to City X. To improve communication, the president of the organization decided to install a desktop video-conferencing system in all offices. This would allow each member to click on a digitized rolodex type list and be connected to the office of their co-workers through a two-way video connection. It was thought that this situation would be a perfect place to perform a longitudinal study on the IIE instrument to determine if it measured incidental information exchange differences with the use of the video system.

Before the video system was installed, a team of three interviewers were trained in conducting the structured interviews for capturing the factual information for the IIE instrument. On a Friday, all members of both offices were interviewed using the structured interview form shown in table 1. During the weekend, the factual statements were prepared for each of the individuals and mailed to them for fact checking. Each individual was called and went over the factual statements about him or her. Any statement that was deemed incorrect was corrected by the person. At midday, all the statements were compiled into the IIE instrument. An example is shown in table 2. This instrument was administered in late afternoon to all members of both offices except for one individual who left town in early afternoon. The traveling person filled out the instrument on Thursday.

Following this initial administration of the instrument, the desktop video-conferencing system was installed. This data collection was rerun three months after the video system was installed. The same procedure was followed with this group of individuals for a second administration of the interview and the instrument. In the second set of interviews, the data collected was somewhat more time sensitive, that is, related to current events that had happened to the individuals. This is because some of the more persistent background data had already been captured in the first set of interviews. However, as two managers were traveling when the second IIE instrument was administered, one manager filled out the form within five days and a second manager did so within two weeks.

The intent of the study was to administer the instrument six months later, but several external events happened to the organization and to the video-conferencing system. First, the state government cut back its funding for the organization and three individuals were laid off. Second, the desktop video-conferencing system was poorly received and not used by at least three people in the organization. This was expressed by such behaviors as taping up the camera lens, pulling out all wires to the system and never turning the system on. Needless to say, the initial intent of this study to measure communication changes was not viable in this environment. After about nine months, the video-conferencing system was removed under the guise of changing computer.

What was collected in the study was a set of data that could be used to begin an initial evaluation of the validity and reliability of the instrument being developed. The number of people involved in the study is too small to perform statistical analyses of the data, but a descriptive statistics analysis was done to suggest that the instrument might be an effective way to measure work relationship building communication without resorting to time consuming observation or untrustworthy self report.

**RELIABILITY, VALIDITY OF THE IIE INSTRUMENT**

This section deals with the issue of instrument reliability and validity by (1) analyzing the IIE captured data and comparing it to self-reported familiarity and to other studies that looked at differences in incidental information sharing based on gender and co-location. If the IIE instrument conforms to participants’ self-reported familiarity with their colleagues and illustrates those same differences then some corroboration is established that it is obtaining the information being sought; (2) comparing the data collected at time 1 to the data collected at time 2. If they do not exhibit large differences, then the measure is reliably getting the same results with each administration of the instrument.

**Validity**

*Validate against self-reported familiarity*

Before participants did the matching test, they were asked how well they thought they knew co-workers. A sample question is as follows:

Please indicate how well you know the following individual  
 Kay: 0 (Not well at all) | 1 (not well) | 2 (somewhat) | 3 (well) | 4 (very well)

Table 3 shows the comparison of IIE questionnaire results with self-reported familiarity. Each participant reports his familiarity with the other seven participants and therefore, for a total number of 8 participants, there are overall, 56 reports, which are classified into five categories according to level of reported familiarity. For each of the five categories, the number of correct answers the participants in that category got are summed up, and then divided by the number of participants in each category respectively to get the average number of correct answers for each category. The leftmost column in table 3 is the categories of reported familiarity and the rightmost column is the average number of correct answers for each category. The average number of correct answers people got increases as the reported familiarity increases. Therefore, it is inferred that IIE instrument reflects the level of knowledge people think they have about their colleagues.

Reported Familiarity	Number of questions answered correctly										Average	
	0	1	2	3	4	5	6	7	8	9		10
<b>Know very well</b>							1	1				<b>6.5</b>
<b>Know well</b>		1	1	2	4	3					1	<b>4.2</b>
<b>Know somewhat</b>	3	4	4	5	2	2		1				<b>2.5</b>
<b>Don't know well</b>	3	5	4	2	1							<b>1.5</b>
<b>Don't know at all well</b>	2	2		1	1							<b>1.5</b>

**Table 3. Time 1 self-reported familiarity compared with IIE instrument results**

*Validate against effects of collocation on self-disclosure*

In table 4, the IIE instrument results are analyzed by location. On questions about each City X participant, each City Y participant got 2.2 correct answers on the average, lower than the 3.1 average correct answers by each City X participant. On questions about each City Y participant, each City Y participant got 4 correct answers on the average that is more than the average 2.4 correct answers each City X participant got. Therefore, the IIE instrument results conform to past research findings that collocation enables more self-disclosure to take place by facilitating spontaneous and efficient communication (Kraut et. al, 1990; Root, 1988).

	<b>Who the questions are about</b>	<b>Average no. of correct answers by City X Participants</b>	<b>Average no. of correct answers by City Y Participants</b>
<b>Located in City X</b>	<b>A</b>	1.8	1.5
	<b>B</b>	3.3	2.0
	<b>R</b>	2.5	3.0
	<b>P</b>	2.5	1.5
	<b>J</b>	1.7	2.5
	<b>R2</b>	3.7	2.5
	<b>Overall average</b>	<b>3.1</b>	<b>2.2</b>
<b>Located in City Y</b>	<b>V</b>	3.7	3.0
	<b>M</b>	1.2	5.0
	<b>Overall average</b>	<b>2.4</b>	<b>4.0</b>

**Table 4. Time 1 IIE instrument results by location**

*Validate against gender difference in self-disclosure*

Gender differences have been found in self-disclosure, and women tend to disclose more often and on more topics than men (Steel, 1991; Foubert and Sholley, 1996). The IIE instrument results display the same difference. To remove the noise of proximity, only the gender difference in IIE results on City X participants is discussed. Table 5 illustrates that there are 15.3 correct answers on the average on questions about each woman but only 9.5 average correct answers about each man.

	<b>Participants</b>	<b>No. of correct answers by City X Participants</b>
<b>Female</b>	<b>A</b>	11
	<b>B</b>	20
	<b>R</b>	15
	<b>P</b>	15
	<b>Average</b>	<b>15.25</b>
<b>Male</b>	<b>R2</b>	9
	<b>J</b>	10
	<b>Average</b>	<b>9.5</b>

**Table 5. Gender difference in time1 IIE instrument results**

**Reliability**

The high correlation between self-reported similarity and IIE instrument data are again found in time 2 data (see table 6).

Reported Familiarity	Number of questions answered correctly										Average	
	0	1	2	3	4	5	6	7	8	9		10
<b>Know very well</b>		1							1			<b>4.5</b>
<b>Know well</b>	2	3	2	3	2	2		1	1			<b>3.0</b>
<b>Know somewhat</b>	3	4	3	2		2						<b>1.9</b>
<b>Don't know well</b>	5	8	5									<b>1.0</b>
<b>Don't know at all well</b>	3		3									<b>1.0</b>

Table 6. Time 2 self-reported familiarity compared with IIE instrument results

Co-located participants still know more about each other than non-co-located participants (see table 7).

	Who the questions are about	Average No. of correct answers by City X Participants	Average No. of correct answers by City Y Participants
<b>Located in City X</b>	<b>A</b>	2.8	1.5
	<b>B</b>	5.3	1.5
	<b>R</b>	3	1
	<b>P</b>	3.5	0.5
	<b>J</b>	2.5	2.5
	<b>R2</b>	2.2	2.2
	<b>Overall average</b>	<b>3.2</b>	<b>1.5</b>
<b>Located in City Y</b>	<b>V</b>	4	6
	<b>M</b>	1.2	9
	<b>Overall average</b>	<b>2.6</b>	<b>7.5</b>

Table 7. Time 2 IIE instrument results by location

The consistent patterns found in time 1 and time 2 instrument data support the reliability of the IIE instrument.

**CONCLUSION**

In this pilot study, the IIE instrument results illustrate how well coworkers think they know their colleagues. The instrument results are in line with past research findings on the role of proximity in fostering social communication in workplace and also with research findings on gender difference in self-disclosure. The same patterns are identified in both time 1 data and time 2 data. The results of the two administrations of IIE instrument imply the validity and reliability of the instrument. However, several limitations exist in the pilot study:

- The instrument data yields low statistical significance due to the small sample size that was used.
- The small sample of office workers may not be representative of a general office workforce.
- For various reasons such as learning through the interviews that two respondents were afraid of being monitored by their supervisors, participants in the study did not use the desktop videoconferencing technology at a level that would lead to any measurable communication changes. In addition, because resistance to the desktop videoconferencing system from a number of employees, the technology was eventually removed before the subject population had used it for the substantial length of time that is required to set up comfortable communication exchanges. This study is therefore not able to provide data using the measure to analyze the impact of the desktop videoconferencing installation on the workgroup’s social communication.
- Different interview styles and media were used in the structured interview. This may change the level of information the interviewees disclose to the experimenters. Also there could be a wide variance in the type of information different people are willing to disclose about themselves. This may in turn result in questionnaire items varying in the degree of difficulty. This problem was not addressed.
- Although respondents disclosed information about themselves that was specifically requested in the interview, this does not mean that the information was disclosed to their co-workers. Thus, the method used in this study may have

a tendency to underreport the incidental information exchange. The instrument could have been improved by asking if the information listed in the matching test had been disclosed to at least one co-worker.

- Traveling employees did the matching test days after the other employees. This could have had some impact on the results of the study.
- Finally, this type of casual information exchange is very time dependent, that is, co-workers are not likely to remember the information for a long period of time. This requires all the interviews and matching tests to be conducted in a short time window.

The instrument has to be run on a variety of population in a longitudinal field study. Limitations in the pilot study should be addressed and overcome. External judges are needed to determine if the level of details asked about each respondent are equal. Weights can be assigned to questions based on the degree of difficulty. A mechanism needs to be created to assign and calculate scores in light of question weights. Multiple measures, for example structured interview of people's perception of work relationship with their colleagues, should be developed and administered to see how well the IIE measure correlates with other instruments. Observation or communication system log should be used to assess how well this instrument captures social knowledge being shared in workplaces. Particularly needed is to measure workgroup choice and work relationship measurement in a natural organizational setting to see how well this instrument reflects actual work relationship development.

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