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Voluntary and Involuntary Self-Disclosure in Decision-Making Virtual Teams

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ABSTRACT

This study investigates the roles of visual representation and verbal self-disclosure in decision-making virtual teams via a content analysis of group discussions. Findings indicate that visual representation encourages increased self-disclosure in the form of personal and universal revelations of facts and thoughts during virtual group communication. Increased revelations are in turn found to impact the nature of group decisions. These results have theoretical and practical implications for virtual group decision making.

INTRODUCTION

In a business environment where fast-paced technological advances have created the need for rapid response, many organizational activities have shifted to electronic media (Souren, Seetharaman, Samarah, & Mykytyn, 2004). Virtual teams have become a common decision-making entity for both operational (Schmidt, Montoya-Weiss, & Massey, 2001) and strategic (Maznevski & Chudoba, 2000) decisions. In many of these cases, teams of responsible parties are ad hoc, consisting of people who have never worked together before. Because of the often critical nature of such decisions it is crucial that managers and these remote decision-makers best understand the medium through which they collaborate.

In fact, many researchers have undertaken this imperative by examining various modes of communication and how they impact groups' decision-making processes and their resulting decisions and recommendations (for example: O'Leary & Cummings, 2007). In particular, a number of studies have looked at the way that communication systems represent their users and found that this can impact the decisions that result from interactions supported by these systems (Malhotra & Majchrzak, 2005). Often the results of these studies are the basis for recommendations regarding the use of communication systems within virtual teams. To our knowledge, however, no studies have delved much further to uncover why and how different modes of representation have different effects on group outcomes. In fact, it is recommended that in order to gain this insight, a content analysis of the decision-making process of groups using these systems must be performed (Benbunan-Fich, Hiltz, & Turoff, 2002). By opening this "black box" of the team's actual communication prior to making a decision, we have the opportunity to uncover the underlying phenomena that elicit the observed outcomes.

The focus of the current study is visual representation of ad-hoc virtual team participants involved in electronic group decision making. We seek to investigate not only what outcomes can be expected from teams depending on how their members are represented. More

fundamentally, we also seek to understand what is different about the way team members interact under varying modes of representation. With this information, we can both explain the specific outcomes of group decision making as well as acquire additional insight into group interaction that can be applied more globally.

BACKGROUND

Visual Representation

Long before computer-mediated interactions became prevalent in group communication, seminal work in sociology indicated that in face-to-face encounters, individuals seek to acquire information about each other to determine expectations and understand each others' behavior (Goffman, 1959). In ad-hoc acquaintances, this information is gathered based on clues from a person's conduct and appearance allowing people to apply their previous experience with similar individuals or decide whether they can rely on what the individual says about himself. In electronic communication, this information is gathered largely via a system's representation of its users. Computer-mediated communication systems offer ways to transmit information about a person's appearance (visual representation).

Although computer mediation has been said to attenuate most social context cues (age, appearance, rank, etc.) that are available in a face-to-face environment, a computer-mediated session in which continuity of interaction is essential often provides means for identifying who the participants are so that a meaningful conversation can ensue. Consequently, different communication media encapsulate and portray the identity of their users in different ways.

A communication system often provides textual and graphical means to represent the identity of its users. Textual representation refers to the user name or handle which could be the user's real name, a computer generated one, or a user chosen screen name. Graphical representation of users often comes in the form of avatars that are either imported by the user or chosen from a selection of possible avatars, sometimes customizable images of people, animals, or cartoons. The chosen form of representation can be characterized based upon the extent to which it is "true-to-life". For example, a photograph is a more "true-to-life" personal representation than a fictional avatar. Avatars frequently gain special meaning within a virtual community as a symbol of identity, which users are sometimes able to manipulate with the ability to modify the appearance of the avatar (Kang & Yang, 2006). When controlled by the user, the avatar is a powerful tool for expression of self, or deception thereof (Holtjona & Nah, 2007). It is therefore important to understand the effects that communicating with fictional visual representation has on communication as some researchers have done (Kolko, 1999; Lee, Kozar, & Larsen, 2005).
Prior literature in virtual teams has examined various modes of visual representation. Originally this was done from the perspective of complete anonymity versus total identification via names (Sia, Tan, & Wei, 2002; Sosik, Avolio, & Kahai, 1997). More recent studies have looked at other forms of representation such as avatars (Huang, Jestice, & Kahai, 2009) and video images (Baker, 2002). Such studies have shown that the online identity created by representation mode has impacts on the process and outcomes of group work and decision making.

Self-Disclosure

Computer-mediated interaction seems to be an ideal forum for disclosure of personal information (self-disclosure). The first signs of this tendency were studies that indicated people disclosing personal information more readily in a computer-based medium (Kiesler & Sproull, 1986; Sussman & Sproull, 1999; Weisband & Kiesler, 1996) and suggested that users are more likely to feel the freedom to self-disclose to one another using computers (Weisband & Reinig, 1995). While the number of message boards and chat rooms that exist on the Internet where people share personal experiences and advice seems to indicate that self-disclosure does in fact occur in electronic communication, there is empirical evidence that the use of computer-mediated communication fosters an increased level of self-disclosure when compared with telephone and face-to-face communication (Joinson, 2001; Tidwell & Walther, 2002).

Self-disclosure has been said to impact the outcome of group interactions. Task-focused self-disclosure has been shown to result in enhanced group productivity (Elias, Johnson, & Fortman, 1989). Additionally, self-disclosure has been mentioned as one of the factors that enhances a team's ability to appreciate the uniqueness and capabilities of each of its members allowing it to achieve "the optimum interdependence characteristic of a high performance team" (Holton, 2001). Self-disclosure is an important process characteristic that is likely to influence the direction of group discussions and the nature of group decision making.

Self-disclosure has been conceptualized and measured based on the revelation of three different types of personal information. The intuitive form of self-disclosure is when communicants reveal facts about themselves. Often, however, group participants might choose to disclose their personal thoughts and/or emotions (Laurenceau, Barrett, & Pietromonaco, 1998).

Hypotheses

Clearly there is a strong connection between visual representation and self-disclosure. To a certain extent, the characteristics of a communication medium can control the way that communicants perceive one another by transmitting *non-verbal* communication cues. In this case we highlight the non-verbal cue -- appearance of the participants. To the extent that virtual communicants are visually represented, information about their appearance is transmitted. However, despite the characteristics of the communication medium, *verbal* communication cues (i.e. the content of the communication) will also transmit information about the participants. The information that is transmitted in this manner is determined by the extent to which participants choose to disclose personal information about themselves and the type of information they choose to disclose (facts, thoughts, and/or emotions). In a sense, visual representation is an involuntary form of self-disclosure.

The *norm of reciprocity*, in which social beings are expected to respond to gestures of others in kind (Gouldner, 1960), is a concept widely discussed among psychology researchers. Among many areas, this concept has been applied to electronic self-disclosure showing that people tend to respond to self-disclosure with more self-disclosure causing an escalation in mutual disclosure once it is begun (Barak & Gluck-Ofri, 2007; Moon, 2000). Given the norm of reciprocity, we might expect that involuntary disclosure of personal information could begin the chain of mutual disclosures, encouraging participants to voluntarily disclose information about themselves. In other words, virtual communicants whose visual representation discloses more information about

their appearance are likely to engage in more verbal self-disclosure than communicants whose visual representation discloses less information about their appearance. We therefore hypothesize that:

H1: Members of virtual teams whose appearances are disclosed by the system will engage in more verbal self-disclosure than members of teams whose appearances are not disclosed.

It is also clear that once self-disclosure has taken place during verbal exchange in a group discussion, the level of identification set forth by the media characteristics no longer holds. Verbal communication has the capacity to drastically change the way that people view each other. For example, even if a communication system operates under visual anonymity, verbal communication can transmit personal information about the communicants via voluntary self-disclosure. Consequently, it is futile to try to understand how visual representation alone impacts group outcomes. The personal revelations within the content of the team's verbal communication complement the original conditions created by the system. Therefore the content of group discussions must be examined for revelations in order to better understand a team's results.

When personal revelations occur during verbal communication, aside from learning things about each other, communicants detect and react to the tone that is set by these revelations. The atmosphere of the group discussion, in turn, impacts the nature of the decisions or recommendations that are made by the team. In particular, personal revelations indicate that communicants are being honest and open and set a tone of sincere evaluation. Subsequently, the decisions that result from discussions marked by honesty and openness are ones that more accurately reflect the true feelings and opinions of the team members rather than the opinions that are assumed to be expected or acceptable. Based on this expectation we predict that:

H2: The exchange of personal revelations in the group discussion process will affect the nature of group decisions.

This theoretical background clarifies how important it is that any attempt to understand how the nature of a group decision is impacted by media characteristics includes a content analysis of the electronic discussions held by the decision-making team. Figure 1 represents a model of the specific relationships being examined in this study. It is expected that visually identified communicants will engage in more personal disclosure and in turn the tone of the discussion will be one that encourages sincere evaluations resulting in honest recommendations.

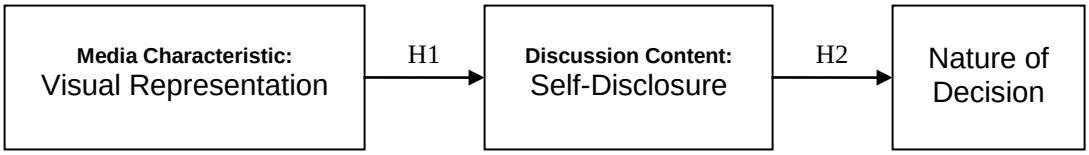

Figure 1: Research model.

RESEARCH METHODS

In order to test our hypotheses, we conducted a laboratory experiment where visual representation was manipulated at two levels. While some users were represented by a fictional avatar, others were represented by a photograph of themselves. Avatar-identified participants were represented with a picture of a static object (such as a snowflake) that was gender-neutral. In all cases, users were identified with a non-descriptive and generic username chosen by the researchers. Participants for the study were recruited from the population of students at a large urban university in the Northeast of the US using fliers and classroom announcements to elicit volunteers. All participants were offered a ten-dollar incentive for their time of about an hour. Participants were randomly organized into groups of three members and each ad-hoc group was randomly assigned to a communication system that presented the avatars or photographs of the members of the group. Before the start of the experiment, each participant was given a short case to read. The case presents the situation of a fictional character (John), who is strapped for cash and faces the ethical dilemma of whether or not to download music through unapproved channels as a party gift for his friend. (See Appendix for the complete text of the case.) Since this case is ethically charged and realistic for the experiment subjects it is a good choice as a tool to assess both revelations in a discussion and the nature of decisions made as a result.

To begin the group discussion, each subject was directed to a group page that showed either a photo or avatar to represent each of the group members (depending on the manipulation) and given explicit instructions on how to begin chatting with the group using a synchronous messaging software (i.e. chat). Each group was then asked to use the given synchronous communication system to discuss the assigned case and produce a written recommendation for the character in the case. In particular, the groups were instructed to include answers to the following questions in their reports:

1. **Is John right or wrong in his decision to download music? Why?**
2. **If John came to you for advice, what would you recommend him to do (to download or not to download)?**

The experiment took place in a computer laboratory specially outfitted with the chat software. Although the students were collocated, each individual was assigned to a computer as he walked into the lab. The workstations were all around the perimeter of the room facing the laboratory walls, and were separated from each other by cubicle-like partitions to prevent physical interaction. The task procedure was run in numerous sessions each of which included several groups working simultaneously so that it was not clear who the team members were. In fact, some participants indicated after completing the task that they were not aware that the people they were interacting with were even in the same room. Students were not given a time limit for completing the task but the recommendation was to spend about 35 minutes on the actual task, which entailed the discussion of the case with the rest of the team and the production of a team report. Although many took some additional time, most of them had self-imposed time limits because they had scheduled only one hour to complete the task.

Measurement of the self-disclosure that occurred during the group discussions was determined via a content analysis of the transcripts of the group chats stored by the system. The nature of the decision was determined by performing a content analysis of the written reports submitted by the groups to extract the recommendation that was made.

ANALYSIS AND RESULTS

Sample

The following analysis is done in two parts, each consisting of a separate content analysis. To determine the amount of self-disclosure that occurred among the groups, we collected and analyzed the content of the transcripts created by the chat system during the session for each group discussion. To determine the nature of the decision of each group, we analyzed the content of the recommendation reports that were submitted at the conclusion of the session. During the experiment, we successfully recruited 87 groups to discuss the case electronically and write recommendations. Due to logistics constraints, a few groups ended up with two members instead of three. During data collection, transcripts for four of the groups were not properly saved and could not be included in the analysis. In addition, two of the reports were lost (due to being improperly saved) and during coding it was found that another two groups did not complete the assignment as expected and their reports could not be coded. Therefore, we have complete data (discussion transcript & reports) for 235 participants organized in 79 groups (77 groups of three members plus two groups of two). The distribution of this sample among the experimental conditions is reported in Table 1.

	Individuals	Groups
Avatar-identified	114	38
Photo-identified	121	41
	235	79

Table 1: Sample size.

Content Analysis of Chat Sessions and Reports

The content analysis of the chat sessions was done by two independent coders who recorded whether or not each individual participant engaged in self-disclosure relevant to the group decision under discussion. The coders recorded each type of self-disclosure for each individual by recording revelations of facts, thoughts, and feelings (Laurenceau et al., 1998). In this case, to detect revelations of fact relevant to the discussion of digital music downloading, coders looked for personal confessions of having downloaded music illegally ("I did it."). Revelations of thoughts were measured in the form of universal admissions of general downloading activity ("Everybody does it."), and for revelations of feelings the coders recorded statements of empathy toward the character in the case ("I would do the same thing in his situation."). Inter-coder reliability calculated as the percentage of agreement between the coders for these revelations in the chat sessions was found to be at an acceptable level (>.7) for all types of disclosure (See Table 2.)

The reports were coded according to an a priori scheme to classify the answers to the explicit questions presented by the case. This coding was also done by two independent coders. Inter-

coder reliability calculated as the percentage of agreement between the coders in each variable was found to be at an acceptable level (>.7) for the answers to both questions (See Table 2.)

Variable	**Percentage of Agreement**
Disclosure in Chat	
Confession	88.6%
Universal Admission	86.1%
Empathy	89.4%
Report Content	
OK to Download?	84.7%
Advice to John	89.4%

Table 2: Inter-coder reliability.

In order to use the coded content in the following analyses, the discrepancies between coders were discussed and reconciled. Often discrepancies were due to one coder's oversight of a revelation, or misinterpretation of a chat comment or group response, and were easily corrected.

Individual Level Analysis

To test our first hypothesis, that visually represented chat participants disclose more than those whose appearance is hidden, we analyzed the coded content of the chat discussions by condition. A Chi-square analysis of the distribution of disclosers was significant for personal confessions, but not for universal admissions or empathy. Significantly more participants whose appearance was disclosed with photos were found to confess having personally downloaded music than participants whose appearance was hidden (p<.01). See Table 3.

	Personal Confessions	Universal Admission	Empathy
Avatar-identified	25 out of 114 (22%)	51 out of 114 (45%)	12 out of 114 (10.5%)
Photo-identified	46 out of 121 (38%)	34 out of 121 (28%)	13 out of 121 (10.6%)
Chi-Square	6.75**	1.97 (n.s.)	0.0001(n.s)

** Significant at the 1% level

Table 3: Individual level analysis with Chi-square test.

The analysis of disclosure by representation mode thus lends partial support to H1. Participants identified with photos tend to engage in more personal confessions than those represented by avatars (p<.01). However, no significant results were found for universal admissions or empathy given the two types of representation.

Because the individuals were nested in groups when they received the treatment we conducted Hierarchical ANOVAs to compare revelations among experimental conditions in order to take into account the effects of the group (Gallivan & Benbunan-Fich, 2005). Table 4 presents the results of the HANOVA. Using HANOVA, the models for personal confessions, universal admissions and empathy are significant with a p-value of .001. The mode of representation (photo vs. avatar) is significant only for personal confessions. This result is consistent with the Chi-square test reported above and lends partial support to H1. For all three variables, the effect of the group is in fact significant with a p-value of .001. Therefore, the remainder of our analysis takes place at the group level.

Dep. Var.: ***Personal Confessions***			
HANOVA Results			R^2=56%
	F	P	
Model	2.55	0.001	***
Representation	10.17	0.01	**
Group Effects	2.45	0.001	***
Dep. Var.: ***Universal Admissions***			
HANOVA Results			R^2=51%
	F	P	
Model	2.09	0.001	***
Representation	2.68	0.10	
Group Effects	2.08	0.001	***
Dep. Var.: ***Empathy***			
HANOVA Results			R^2=49%
	F	P	
Model	1.97	0.0002	***
Representation	0.00	0.99	
Group Effects	2.00	0.0001	***
* Significant at the 5% level; ** Significant at the 1% level; ***Significant at the 0.1% level			
[1] The interaction is significant at the 5% level when the group is considered as the error term.			

Table 4: HANOVA analyses.

Group Level Analysis

To test our second hypothesis, that the exchange of personal revelations within the chats will impact the nature of the decision, we analyzed the coded content of the reports produced by each group as a recommendation for the character in the fictional case. Table 5 summarizes the contents of these reports including whether or not the group felt that it was acceptable to download music through unapproved channels and whether they advised the character to download or not to download. According to a Chi-square test, there is a significantly unbalanced distribution of groups in each cell. The majority of the group reports acknowledge that downloading is fine but advise not to do it. This position is closely followed by several groups

that recognize that downloading is wrong and recommend doing it nevertheless. Only a handful of group reports endorse the practice of downloading and recommend doing it.

	Advice: Do it	Advice: Don't Do it	
Downloading Wrong	23 groups	14 groups	37 groups
Downloading Fine	4 groups	38 groups	41 groups
	27 groups	52 groups	
Chi-Square = 24.23***			

***Significant at the 0.1% level

Table 5: Content analysis of reports.

To test for differences in the decisions and advice of the groups by condition, Chi-square tests were conducted for both personal confessions and universal admissions. For these analyses, discussion content was aggregated by creating a group-level dichotomous variable indicating whether the type of revelation occurred by any member of the group or not. The results of the Chi-square test for personal confessions summarized in Table 6 indicate that a significantly greater percentage of groups who experienced personal confessions in their group discussions advised downloading than groups who did not exchange any personal confessions. Results do not indicate that personal confessions have a significant relationship with the groups' decision of whether or not it is acceptable to download music.

	Downloading Wrong	Downloading Fine
No Confessions	19 out of 79 24%	18 out of 79 23%
Some Confession	18 out of 79 23%	24 out of 79 30%
Chi-Square=0.57 (n.s)		
	Advice: Don't Do it	Advice: Do it
No Confessions	18 out of 79 23%	19 out of 79 24%
Some Confession	9 out of 79 11%	33 out of 79 42%
*Chi-Square = 6.47***		

** Significant at the 1% level;

Table 6: Group level analysis of confessions with Chi-square tests.

For universal admissions, the results of the Chi-square test summarized in Table 7 indicate that a significantly greater percentage of groups who discussed the widespread practice of downloading nowadays (universal admissions) in their groups decided that downloading music is not acceptable than groups who did not admit that downloading is universally performed. In

addition, a significantly greater percentage of groups who disclosed their thoughts about universal downloading behavior advised the fictional character to download in his situation than groups who did not discuss universal admissions of downloading.

	Downloading Wrong	Downloading Fine
No Admission	8 out of 79 10%	19 out of 79 24%
Some Admission	29 out of 79 37%	23 out of 79 29%
*Chi-Square=4.88**		
	Advice: Don't Do it	Advice: Do it
No Admission	5 out of 79 6%	22 out of 79 28%
Some Admission	22 out of 79 28%	30 out of 79 38%
*Chi-Square = 4.47**		

* Significant at the 5% level;

Table 7: Group level analysis of admissions with Chi-square tests.

Similar analyses for the empathy variable showed no significant associations between empathy declarations during the discussion and the view of downloading or the advice provided.

To summarize, while the analysis of the report content variables (downloading & advice) by representation mode (avatar vs. photo) did not reveal any significant differences, the analysis of two discussion variables (personal confessions & universal admissions) did show significant associations with the content of the reports. These results suggest that if there is a discussion about "everybody does it" in the group, or if there is a personal confession in the group, the advice is to go ahead and download. Therefore, these group-level results support H2.

DISCUSSION

This study investigated whether different types of visual representation in ad-hoc teams had an impact on the discussion and outcome of group decision making. The findings suggest that visual representation via photos encourages team members to engage in more personal revelations than when an avatar representation is used. This finding is noteworthy as it occurs in ad-hoc teams of participants that have neither prior knowledge of each other, nor a history of working together before.

More personal revelations encourage group discussions to be more open and honest which in turn affects the nature of group decision making. In particular, groups where team members admitted that they personally downloaded music, tend to view this practice as acceptable and recommend doing it. Similarly, those groups who view the practice of downloading as an

indication of a widespread phenomenon (universal admission) use this information to shape their recommendation.

Interestingly, however, representation mode does not appear to impact group decision making directly. The content of the group report is mostly affected by what happens during the discussion process. Our findings indicate that while photo representation encourages more personal confessions, it does not directly influence the nature of the group decision. Put differently, although the group factor is significant in the HANOVA tests, direct analysis of report content by representation mode are not significant. This finding suggests that the content of the report is the result of the group dynamics as they play out in the discussion process.

These empirical results have important theoretical and practical implications. At the theoretical level, involuntary (or non-verbal) disclosure via photo representation is likely to influence voluntary (or verbal) disclosure in the discussion process. When team members reveal personal information about their own behavior, the ensuing discussion is perhaps more sincere than in teams of ad-hoc members who interact without exchanging personal confessions. Our study has thus documented the impact of self-disclosure and the role of reciprocity in the process and outcomes of group decision making. Unlike prior studies that rely on perceptions to document these effects, ours used a content analysis of the group discussion and the reports. Furthermore, the content analysis reveals a relationship that would not have been discovered in a traditional comparison of group outcomes by experimental manipulations of visual representation. This finding underscores the importance of the group process variables as determinants of group outcomes.

At the practical level, our results suggest that more personal revelations lead to more honest advice, less vulnerable to social desirability bias. In fact, groups who did engage in personal revelations were more likely to tolerate downloading and recommend doing it, where as groups without personal revelations are equally split among the options. It seems that more personal revelations lead to more honest assessments of the particular situation and instead of giving politically correct advice or socially expected recommendations, the groups were more sincere in their decision making. Although this can lead to more leniencies in the handling of delicate situations, it is also likely to produce more realistic outcomes and more satisfied team members.
Our results should be interpreted in light of the limitations of the study. The participant sample comes from the undergraduate student population at a major urban university and it is thus fairly homogeneous. Participants received a monetary incentive but did not have a stake in the outcome of the experimental task. Some technological limitations impacted the experimental procedure. For example, the researchers could not enforce that people kept the pictures of their teammates open at all times even though they were instructed to do so. However, since "meeting the group" was the first instruction to start the discussion and was fairly easy to accomplish, it is reasonably likely that the majority of the participants were looking at the photos of their teammates for at least part of the task time allotment. Still, persistent photographs are recommended for follow up experiments of this nature. Also, due to the nature of the collaboration system, it was difficult for teams to work on their recommendations together and the job often fell upon one team member who took upon himself or herself the task to record and summarize the outcome of the group decision. Given the limitations of the chat system, the reports did not benefit from either collaborative writing or group editing. For future research, it

would be advisable to incorporate a collaborative writing tool or a wiki to facilitate the joint production and editing of the report.

CONCLUSION

This study advances our understanding of the role of self-disclosure in group decision making. Findings indicate that involuntary self-disclosure via photo representation of team members leads to voluntary self-disclosure in the form of personal revelations. The ensuing group discussion in turn affects the nature of group decision making. If more personal revelations lead to more honest assessment of a situation and more sincere advice, virtual representation can be used to indirectly influence the nature of group decision making in ad-hoc teams.

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APPENDIX

The Case

John is a sophomore in college and he is paying for his own education and living expenses in New York. Daily, he commutes by train from his part time job to attend evening classes at the college. To help him unwind and shift modes, he enjoys listening to music on his hand-me-down MP3 player during his commute. Strapped for cash, John is unable to invest money in CD's to enhance his limited music collection. He feels he must conserve as much money as he possibly can to help pay for the textbooks and software that he needs for his classes. John feels that his best option is to download free but copyrighted MP3 files using one of the popular peer-to-peer sites that allow users to share music among them, even though he is aware that they are not approved by the authorities that represent the recording industry.

This semester John has been invited to a classmate's party. He welcomes the break from his everyday routine and the opportunity to hang out with his friends but he feels uncomfortable showing up without a gift. Having used the last of his spending money on his regular expenses, John burns a dozen of his friend's favorite selections from his own downloaded MP3 collection onto a CD and brings it with him to the party. The CD turns out to be a big hit among the party guests.

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