CHARTJUNK OR GOLDFRAPH? EFFECTS OF PRESENTATION OBJECTIVES AND CONTENT DESIRABILITY ON INFORMATION PRESENTATION

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Abstract
Most research on information presentation is based on the rational approach to display design. This approach assumes that the quality of displays is determined by their relative efficacy to provide the relevant information for the viewer, as assessed through variables such as response latency, accuracy, or decision quality. However, presentations often are intended to convince viewers and create desired impressions. These considerations may lead to the choice of displays that differ from those prescribed by the rational approach. Three experiments addressed the degree to which the presenter’s objectives and the desirability of the presented information affect presenters’ preferences for display formats. Presenters exhibited different preferences when they tried to create a favorable impression compared to when they tried to reach optimal decisions or provide information for optimal decision making by others. There was an increased use of depth in graphic displays when impressions were crucial, and this tendency was particularly strong when the presented information was undesirable for the presenter. The results demonstrate the importance of understanding the social circumstances of information presentation when evaluating the adequacy of display formats.

Keywords: Information presentation, communication visuals, self-presentation, impression management, presentation preferences, business graphics, information desirability, graphic displays, display design

ISRL categories: CB09, DO03, GB03, GB05, HD0101

Introduction
The research on information display in the managerial and IT literature has concentrated mainly on the cognitive efficacy of presentations for task performance and decision making (e.g., Benbasat et al. 1986; Dickson et al. 1986; Jarvenpaa 1989; Lohse 1993a; Meyer et al. 1997; Tan 1994; Vessey and Galletta 1991). Most studies measure performance differences with various
presentation formats and use response latency, accuracy, or decision quality as criteria for evaluating the different formats. However, the actual use of presentation graphics serves purposes that are broader than simply enhancing decision making (e.g., Dennis 1988). Users of business software generally view graphics as a means of communicating their ideas and persuading their audience. This perspective is exemplified by the claim that "in business presentations, whether the goal is to sell, to motivate, to educate or simply to inform, it is the ability to persuade that ultimately determines the degree of success or failure" (Lindstrom 1995, p. 18, emphasis added). This view is also echoed in the names of leading business presentation products, such as Persuasion, Presentation, and PowerPoint.

Some IS researchers have acknowledged the multitude of purposes for information presentation. For example, Jarvenpaa and Dickson (1988) mention deceptive graphics as a common practice. Nevertheless, researchers seem to disdain what was coined by Tufte (1983) "chartjunk" or what Levy et al. (1996) term, more generously, "gratuitous graphics." In essence, the idea is that good graphics should maintain a maximal "data-ink ratio" that is "the proportion of a graphic's ink devoted to the non-redundant display of data-information" (Tufte 1983, p.93). Tufte mentions the addition of false perspective and dimensionality to graphs as examples of bad graphics. Researchers consider these graphic elements to be inefficient or even misleading for proper information presentation. In addition to theoretical argumentation, this view is supported, to some extent, by empirical evidence (Carswell et al. 1991; Siegrist 1996). Similarly, Gillan and Richman (1994), testing Tufte's data-ink ratio principle, found that certain chartjunk elements lower performance while other elements have no such effect.

If dimensionality-augmented and perspective-enhanced graphics have such negative effects, one should expect that vendors of presentation software would be quick to get rid of them. Yet, we observe just the opposite. Practically every existing presentation software provides ample means to overwhelm the user with gratuitous graphics. Intormal observations (e.g., Carswell et al. 1991; Tufte 1983) indicate that the use of gratuitous graphics becomes more common in daily practice. Thus, there seems to be a gap between research-driven guidelines for information presentations and information presentation in practice, and this gap is widening with the introduction of new presentation technologies.

The discrepancy between the rational approach that views information presentation as "the science of graphs" (Cleveland and McGill 1984, p. 531) that is geared to enhance decision making and the approach that views presentation as a means to affect others' attitudes should not come as a surprise. Rational models of information systems have long been criticized for being descriptively insufficient (Hirschheim and Newman 1991; Keen and Scott Morton 1978). Instead, it is argued, most information that is generated and processed in an organization is subject to misrepresentation. Information is gathered and communicated in a context of conflict of interest and with consciousness of potential decision consequences. Often information is produced in order to persuade someone to do something. (Feldman and March 1981, p. 176)

Yet, despite the evidence suggesting the major communicative and persuasive roles of information presentation, most research still reflects a normative approach that judges presentations in terms of their cognitive effectiveness, as if the presenter's sole objective is to enhance the viewer's decision-making process.

We believe that studying information presentation from the neglected viewpoint of the presenter can help narrow the gap that exists between research-driven guidelines and the actual use of presentation formats in organizational settings. In line with O'Reilly et al. (1987), we argue that integrating the traditional decision-making perspective (that concentrates on the interests of the decision maker) with a social-context perspective (that focuses on the interests of the presenter) will enrich our understanding of information presentation in organizations.

The study aims to assess people's preferences for different presentation formats as determined by their objectives and motivation. In particular we
focus on whether they want to provide for optimal decision making or whether they are interested in creating a desired impression. In the next section we briefly review previous research on information presentation. We then discuss the theory of self-presentation. While self-presentation research has not dealt directly with information presentation, it can provide insights into the process by which people create and use presentations. Next, we describe three experiments that tested certain conditions under which we expected presentation preferences to vary. We conclude with a discussion of the findings and their implications.

Previous Research on Information Presentation

Previous research on information presentation focused mainly on efficient decision making. This approach was traditionally taken by management information systems (MIS) and human factors (HF) researchers. A second, less developed, perspective was taken mainly by business communication literature, which emphasized the communicative role of information presentation. This section reviews these approaches.

Efficiency Perspective

The advent of information systems that are capable of easily producing various forms of information representation has prompted much business and research interest as to the relative pros and cons of these presentation visuals. At least since Washburne (1927) have researchers acknowledged the fact that no single display is optimal under all circumstances, and that different displays should be used for different tasks. The contingent relations between presentation format, task, and decision making processes and quality were at the focus of most research and theory on information presentation (e.g., Benbasat et al. 1986; Dickson et al. 1986; Jarvenpaa 1989; Meyer et al. 1997; Vessey and Galletta 1991; Wickens and Carswell 1995). While the popular literature promoted the use of visual graphics over the more traditional form of information tables, researchers remained skeptical about the ubiquitous merits of the former (e.g., DeSanctis 1984; Jarvenpaa and Dickson 1988; Montazemi and Wang 1989; Schaubroeck and Muralidhar 1991).

Recent studies using new theoretical perspectives (e.g., Lohse 1993a; Vessey and Galletta 1991; Wickens and Carswell 1995), research tools (Lohse 1993b), and various decision tasks (e.g., Meyer et al. 1997; Tan 1994; Tan and Benbasat 1990, 1993) increased our understanding of the relative advantages of different presentation formats. Yet, the contribution of the MIS/HF research to understanding presenters' preferences is limited for two reasons. First, these disciplines deal solely with measures of efficiency according to the rational view of decision making (i.e., decision speed and accuracy) and do not take into account the communicative motives of information presentation. Second, and perhaps consequently, it avoids dealing with the ostentatious presentation formats that are promoted by professional presentation software, thus not confronting many of the practical quandaries that information presenters face today.

Communicative Perspective

Response time and accuracy—the performance criteria used by most MIS/HF researchers—are not necessarily the criteria that presenters want to maximize. Other criteria should be considered as well, such as those related to the viewer's response to the displayed information. Dynamic and static graphics were found to be more persuasive than text-only messages (King et al. 1991). However, the possibility that the finding was due to the novelty of the graphic display could not be ruled out. The use of perspective may lower the accuracy of reading and analyzing graphs, but the use of 3D graphics has been shown to elicit a positive attitude change toward imaginary universities among students, relative to 2D graphics (Carswell et al. 1991).

Whereas MIS researchers mainly focus on the cognitive qualities of presentation graphics, the area of business communication stresses the communicative role of graphics and, to some extent, acknowledges the legitimacy of considering presentation objectives other than conveying pure information. It has been suggested that
different presentation objectives (such as persuading or attracting interest) and audience characteristics be considered when constructing presentation graphics (Brown 1985; Doherty et al. 1987). However, business communication guides offer only vague and general advice on how graphics should be used (e.g., Brown 1985; Lesikar and Pettit 1991). They usually do not address the issue of how different types of presentations can help to interest and persuade the recipient. Thus, while acknowledging the existence of multiple presentation objectives, the business communication literature remains silent about how various presentation formats support these objectives.

An Alternative Perspective on Information Presentation

Self-Presentation

While the business communication literature deals with how presenters should behave and which presentation formats they should use, it takes (similar to the efficiency perspective) the receiver viewpoint as its main object of interest. It tells us nothing about why a person would prefer to present information in one way or another, or how these preferences might change as the situation changes. Recent social psychology and interpersonal communication research provides some ground on which these questions can be studied. The basic premise of this line of research is that when people interact they often attempt to manage the general impressions that others form of them (Jones 1990; Leary and Kowalski 1990). The motivation for this phenomenon (known as “self-presentation” or “impression management”) is to maximize expected rewards or to minimize expected punishments and to elicit esteem-enhancing reactions from others (Leary and Kowalski 1990). The scope of self-presentation techniques is quite wide. It ranges from the most tacit to the very implicit. The suggestion is made that people will be more motivated to indulge in self-presentation efforts when they depend on another for obtaining benefits or avoiding sanctions (Jones 1990). In an organizational context, for example, this dependency may take the form of a subordinate who depends on his supervisor for certain rewards. This has been referred to as upward influence, which is “an attempt or attempts to influence someone higher in the formal hierarchy of authority in the organization” (Porter et al. 1983, p. 359).

Self-presentation typically involves selective disclosures and omissions rather than blatant deceit (Jones 1990, p. 174). Jones reports several self-presentation strategies, each having its own benefits and risks. The two main techniques, ingratiation and self-promotion, use different means while seeking different goals and risking different negative attributions. Ingratiation, arguably the most salient self-presentation strategy, is “illicitly designed to influence a particular other person concerning the attractiveness of one’s personal qualities” (Jones 1990, p. 177). However, more relevant to our study is the technique of self-promotion. While ingratiation’s major goal is to increase one’s likability by others, self-promotion seeks acknowledgement by others of one’s competence. Self-promotion is especially common when the claims for competence are presented in front of important audiences or on important occasions (Rosenfeld et al. 1995). As such, self-promotion can be viewed as an upward-influence tactic. For example, in a study of New York State legislative intern, the intern were asked to rate themselves regarding their competence, abilities, and traits (Giacalone and Rosenfeld 1986). The interns exhibited the most self-promotion under the condition of both disclosure (as opposed to anonymity) and reporting to a high status (as opposed to low status) individual.

Information Presentation as Self-Presentation

Why do people present information in one format or another? Levy et al. (1996) conducted the only study to date that deals with presenters’ preferences of graphic displays. In that study, participants were instructed to choose the graphic format they thought most appropriate under various scenarios. In one scenario, the presentation was to be used by oneself “so that you can understand what is going on” (p. 46). In another scenario, the presentation was for a group of people whom the presenters want to understand the findings as fully as possible. Participants overwhelmingly pre-
ferred the 2D graphs over more fancy graphs (referred to as 3D graphs by Levy et al.) when the information was meant for self-use, but were evenly split in their preferences when information had to be presented to others. Levy et al. concluded that 3D graphs were preferred more “for showing others than oneself” (p. 42). However, the belief is that, in the Levy et al. study, the self-other factor was convoluted with another factor that can better explain presentation preferences: the presenter’s objective.

The Presentation Objective
When presenting information, the objective may be either to facilitate efficient decision making (according to the MIS tradition), or to strengthen one’s social status (in line with business communication practices and self-presentation theories). People may prefer simpler graphics because they aim to make better decisions. Consequently, as decision makers, they prefer presentations that facilitate efficient information processing, in accordance with rational theories. On the other hand, when presenting to others, they may be more inclined to create impressive graphics because in this context there is room for self-presentation considerations.

Information presentations create means both for rational decision making and for communicating messages that serve impression management purposes. Our premise is that the specific considerations that guide the presenter in the design of the displays are derived from the presenter’s objectives. We suggest that whenever a display is intended to be viewed by people other than the designer, there will be some aspect of impression management involved in the design of the display. However, the relative importance of this aspect, as compared to the rational aspect of presentation design, may vary considerably under different circumstances.

We contend that people will be more inclined to use impressive presentation formats when their motivation for presenting the information goes beyond merely enhancing decision making. For example, a sensible extension of the self-promotion technique (Jones 1990) suggests that information presentation serves as an opportunity for the presenter to claim competence by means that are not directly related to the information per se. For example, the use of gratuitous graphics may allow presenters to demonstrate their mastery of state-of-the-art technology, or their “professionalism”; they may demonstrate the extra effort they have put into setting up the presentation or show their care about the contentment of their audience. Thus, social considerations in organizations are likely to promote self-presentation behavior in the context of information presentation.

Another factor that can potentially affect presentations is the desirability of the presented information. This issue is discussed next.

Content Desirability
Rational theories of information and decision making are indifferent to the desirability of the message: the presentation format should be chosen independently of whether the content of the displayed information is desirable. However, from a self-presentation perspective, content desirability might well affect presentation preferences. We suggest that this happens because an important motive in impression management is people’s perception that the impressions that others have of them are less positive than they desire. In such cases, people will seek to repair their damaged image by stressing their positive attributes (Baumeister and Jones 1978; Leary and Kowalski 1990). Thus, people might try to compensate for undesirable information (which they perceive to reflect poorly on their image) by presenting the information in an overly designed fashion (trying to bolster their presentation skills). On the other hand, it has been noted that when people’s accomplishments are known, there is social pressure on them to downplay their achievements (i.e., to appear modest) (Leary and Kowalski 1990). Hence, impression management theory would predict that people use gaudy presentations when they present undesirable information, but not when they present desirable information. The relations between the presentation objective, the desirability of the information, and the presentation preferences are depicted in Figure 1.

As opposed to the conclusions by Levy et al., which pointed to the self/other distinction as the major determining factor in presentation preferences, our model distinguishes between two major
conditions: presenting information to enhance decision making and presenting to impress. Whenever presenters are able (or forced) to ignore self-presentation considerations, they are likely to prefer presentations that are more efficient and that are more in line with recommendations in the MIS/HF literature. When self-presentation interests enter into the presenter’s considerations, we expect to find more gratuitous presentations. In addition, when the presentation objective is to impress the viewer, the choice of the presentation format will be affected by the desirability of the presented information. The use of gratuitous presentations should be more frequent when the content of the information is not favorable for the presenter.

To conclude, we contend that people’s choice of presentation formats is largely determined by the context in which the display will be used. This is based on two premises: (1) People use gratuitous presentations as a means of self-promotion; and (2) because people’s self-promotion behavior varies under different conditions, so will their information presentation. Thus, when people feel that the information they are about to present might induce unfavorable perceptions of them by others, they will use more gratuitous presentations to restore favorable perceptions. We designed and conducted three experiments in order to evaluate this contention.

The Experiments

This section presents the three experiments. In each subsection, the rationale that guided the respective experiment, the associated experimental hypotheses, and the experimental methodology and results are discussed.

Experiment 1
Rationale and Hypotheses
The purpose of the first experiment was to test the premise that presentation preferences are
largely determined by the presentation objective, rather than by whether the presentation is to oneself or to others (as suggested by Levy et al. 1996). Consider the following three conditions, in which a person has to choose a presentation format for the purpose of: (1) one’s own decision making, (2) another person’s decision making, or (3) impressing another person. According to Levy et al., when people present information to others (conditions 2 and 3 above), they prefer similar presentation formats, but they will change their preferences when presenting information for their own use (condition 1). In contrast, we predict that similar preferences will be found under conditions 1 and 2, in which optimal decisions are sought, whereas the distinct preferences will be found under condition 3 (where the objective is impression management). Stated formally, the hypothesis is:

H1a: There will be no difference in presentation preferences between presentations for decision making by oneself and presentations for decision making by others.

H1b: Presenters whose objective is to impress others will have different presentation preferences than presenters whose objective is to present for optimal decision making.

Method

Participants. Participants were 242 students from one university and two colleges in Israel.

Presentation formats. Presentations were created using Microsoft's Excel and included three or four different displays, according to the experimental condition, as shown in Appendix A from top to bottom: (1) A standard 2D bar graph. This form is the simplest among the graphic presentations in our study and is most congruent with the call for efficient graphics (Cleveland and McGill 1984; Tufte, 1983); (2) A 2D bar graph with an added appearance of perspective. This type is frequently referred to as a 3D graph in the literature (Carswell et al. 1991; Levy et al. 1996; Siegrist 1996), but the term 2.5D is preferred for this display. This type of graph holds more unnecessary elements than the simple 2D type and in this sense is representative of “chartjunk” (Tufte 1983); (3) A 3D bar graph that uses the Z axis for displaying the two data series (each of which was displayed as a 2.5D bar graph). Here the title 3D is more justified, because all three dimensions of the graph are used. This type is stylistically and technically more complex than the 2.5D type and hence is considered to be the most gratuitous among the stimuli; (4) Half of the participants also saw a table showing the same information as the graphs. The manipulation regarding the appearance of the table was made for two reasons. First, while the literature frequently indicates that users prefer graphs over tables, we wanted to assess these preferences directly. Second, the juxtaposition of a dissimilar presentation format (the table) next to a set of three relatively similar presentation formats (the graphs) enabled testing for possible agenda effects (Tversky and Sattath 1979) in presentation preferences. In the context of this study, agenda effects would mean that users' preferences for a given graphic format depend on the existence of a tabular presentation in the set of available presentations.

All displays showed the sales for two product lines in five months. The number of data points is in line with practice in recent information presentation studies (Carswell et al. 1991; Levy et al. 1996).

Scenarios. The participants were assigned to one of three experimental conditions. In each condition, they were asked to assume that they had a certain role in an organization (see Appendix B for the instructions for each scenario). In the first scenario (Decision-Self), participants assumed the role of a CEO looking for information about sales in the company's Division A in order to make a decision. In the two other scenarios, participants assumed the role of the head of Division A, who presents information to the CEO. In condition 2 (Decision-Other), the information was supposed to facilitate efficient decision making by the CEO, while in condition 3 (impression) the information was supposed to elicit the CEO's most favorable impression about the performance of Division A.

Procedure. Each participant received one page with one of the scenarios and three or four formats (depending on the experimental group) of information presentations. One experimental group received four presentation formats (three graphs and one table). The other groups received
three graphs only. Pages were distributed randomly among the participants as the concluding item on a course’s final exam. Participants were asked to choose the presentation format they considered best for their scenario. The instructions made it clear that there is no right or wrong answer for this task and that the participants would be rewarded with equal bonus points for any answer.

**Dependent Variable.** The dependent variable in this experiment was the choice of presentation format. Participants chose the one presentation format they felt most appropriate for the scenario they were reading.

**Results and Discussion**

Figure 2 depicts the percentage of selections of each presentation format for each presentation objective, after combining the two groups (with and without tables). The percentages are weighted to account for the absence of tables from roughly half the sample.

**Comparing presentations for decision making by others and for decision making by oneself:** The pattern of preferences was identical for the two decision tasks, and was the same when the display was intended for self-use or for another person. Participants overwhelmingly preferred the 2D bar graph to the more gratuitous 2.5D bar graph. The 3D bar graphs and the tables were rarely chosen for the decision tasks. The differences between the two decision conditions (Decision-Self and Decision-Other) in the distribution of preferences of the graphical presentation formats were not significant \( \chi^2 = 1.95, \text{df} = 2, p = .378 \). This result supports Hypothesis 1a. When the presentation objective was decision making, there was no difference in presentation preferences, regardless of whether the presentation was for oneself or for others.

**Comparing presentations for decision making and for impression:** When faced with a scenario that emphasized the need to impress others, preferences for the 2D and 2.5D groups were reversed relative to the decision scenarios, and most participants preferred the 2.5D graphs. The differences between the Impression condition and the two decision conditions were significant \( \chi^2 = 21.64, p < .001 \) for the comparison of the Impression condition with the Decision-Other condition, and \( \chi^2 = 26.97, p < .001 \) for the comparison of the Impression condition with the Decision-Self condition, supporting Hypothesis 1b: Presenters whose objective was to impress others had different presentation preferences than presenters whose objective was to present for optimal decision making.

The pooled results from the two presentation-to-other conditions (Decision-Other and Impression) replicate the results of Levy et al. However, when the objective of the presentation was the creation of an impression, a reversal of preferences appeared. Presenters preferred the 2D graph when the aim was decision making, but decisively preferred the 2.5D graph when they aimed to impress. To conclude, when information presenters target better decision making the “self-other” effect found by Levy et al. disappears. Only when the presentation’s objective was specifically to impress others did presenters prefer the more gratuitous presentations.

**Experiment 2**

**Rationale and Hypotheses**

Experiment 1 revealed a strong effect of the objective of the presentation on the preferred presentation format. The goal of Experiment 2 was to explore the moderating role of content desirability of the message on presentation preferences. Recall that the theory of self-presentation suggests that when people try to impress others, they will try to improve their image by stressing their positive attributes (e.g., constructing glittery graphics), especially when they feel that they are being perceived negatively for other reasons (e.g., when they present information that reflects poorly on their job performance). When the need to impress is reduced (e.g., when the task environment stresses efficient decision making) content desirability should become less relevant. Hence, the hypothesis is:

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1The presence or absence of tables did not affect the proportion of selections of the three graphic formats. The details of this analysis are omitted in the interest of space and readability. The detailed analysis can be obtained by request from the first author.
H2a: There will be no effect of content desirability when the presentation objective is optimal decision making.

H2b: Presenters who try to impress others will have different presentation preferences, depending on the content desirability of their presentation.

In addition to testing the effects of the content desirability, the design of Experiment 2 allowed corroboration of the findings of Experiment 1 with a different response mode. In this experiment, participants were asked for their judgments of each presentation format rather than for their final choice. This method allows not only determination of the order of preferences for display formats but also the degree by which one display is preferred over another.

Method
Participants. The participants were 243 undergraduate and graduate students from one university and two colleges in Israel. None of them had participated in Experiment 1.

Experimental Design. The experiment included the same number of data points and the same presentation formats (including tables) as those used in Experiment 1. The experiment involved one within-subjects factor (Presentation Format) and two between-groups factors (Objective and Content Desirability). The Objective factor had the same three levels as in Experiment 1 and was manipulated by using the same three scenarios that were described in Experiment 1. The Content Desirability factor had three levels (positive, neutral and negative). It was operationalized by manipulating the trend of the data points. In the neutral condition, sales of the two products
fluctuated moderately during the five-month period, and remained constant for the last two months to create a sense of stability in performance. In the positive condition, sales for both products increased continually in each month, and in the negative condition they declined continually. The average monthly sales of each product across the five-month period were equal under all three conditions. Under the positive condition, sales were below the monthly average in the first month and above it in the last month; under the negative condition, sales started above the average and declined continuously. In all, three different scenarios were examined across three types of objectives, giving nine experimental conditions.

**Procedure.** Each participant received one page that included the details of one scenario and four information presentations. Pages were distributed randomly among the participants during a class meeting. They were asked to rate each presentation format’s suitability in the experimental condition on a scale from 1 to 10.

**Dependent Variable.** The dependent variable in this experiment was the suitability of the presentation format to the situation. Participants rated all presentation formats on a 1 (very low) to 10 (very high) scale according to the suitability of the format to the scenario they were given.

**Results and Discussion**

Descriptive results of the ratings are presented in Table 1. A three-factor ANOVA with two between-groups factors (Objective and Content Desirability) and one within-subject factor (Presentation Format) was performed on the participants’ ratings. The ANOVA results are presented in Table 2.

There was a significant main effect of Presentation Format. The 2D graph was the most preferred presentation format (mean = 7.91), closely followed by the 2.5D graph (mean = 7.41). Tables (mean = 5.59) and 3D graphs (mean = 4.79) were the least preferred formats. Scheffe post-hoc tests revealed significant differences at the .01 level between all formats except between the 2D and the 2.5D groups. These results resemble the pattern of preferences for the various presentation formats in Experiment 1.

There was also a significant main effect of the Presentation Objective. This effect means that,

<table>
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<th>Content</th>
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<th>2.5D Graph</th>
<th>3D Graph</th>
<th>Table</th>
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</tbody>
</table>
Table 2. Summary Table of the Anova Results for Experiment 2

<table>
<thead>
<tr>
<th>Effect</th>
<th>df</th>
<th>MSe</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective (O)</td>
<td>2, 234</td>
<td>5.78</td>
<td>3.90</td>
<td>.02</td>
</tr>
<tr>
<td>Content</td>
<td>2, 234</td>
<td>5.78</td>
<td>.80</td>
<td>.45</td>
</tr>
<tr>
<td>Desirability (C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation (P)</td>
<td>3, 702</td>
<td>6.00</td>
<td>88.15</td>
<td>.0001</td>
</tr>
<tr>
<td>O x C</td>
<td>4, 234</td>
<td>5.78</td>
<td>5.1</td>
<td>.73</td>
</tr>
<tr>
<td>O x P</td>
<td>6, 702</td>
<td>6.00</td>
<td>1.36</td>
<td>.23</td>
</tr>
<tr>
<td>C x P</td>
<td>6, 702</td>
<td>6.00</td>
<td>2.25</td>
<td>.04</td>
</tr>
<tr>
<td>O x C x P</td>
<td>12, 702</td>
<td>6.00</td>
<td>1.87</td>
<td>.03</td>
</tr>
</tbody>
</table>

overall, participants rated the presentation formats lower under the impression condition. The mean rating of all four formats was 6.12 under this condition, compared to 6.53 and 6.62 under the Decision-Self and the Decision-Other conditions, respectively.

The three-way interaction is the most relevant finding for our purposes. The mean ratings of each presentation format for the three categories of Presentation Objective and the three content desirability categories are shown in Figure 3. To interpret the three-way interaction, several additional tests were performed.

Testing the Effect of Presentation Objective: A separate ANOVA of the two decision groups to test for the existence of any differences between them (whether main effect or interaction) was performed first. Neither the main effect of the Objective nor any of the interactions that involved the Objective approached significance. The absence of significant differences between the decision groups supports the results from Experiment 1, namely that the ratings of the different presentations in the two decision groups were very similar. This is reflected in the similarity of the patterns of results in the two left frames in Figure 3. The lack of difference between the two decision groups implies that the three-way interaction must have originated from differences between the impression group on the one hand and the two decision groups on the other hand. Thus, H1a and H1b are once again supported by this experiment.

Testing the Effects of Content Desirability: The ANOVA of the two decision groups alone found an unexpected Presentation x Content Desirability interaction (F(6, 480) = 18.60, p < .01). Content desirability had no effect on the ratings of the 2D and the 2.5D graphs, but it had an effect on the ratings of the 3D graphs and the tables (p < .02 and p < .05, respectively). For both decision groups, ratings for tables decreased when Content Desirability was negative, whereas the ratings for the 3D graphs exhibit the opposite tendency. The effect of Content Desirability on the ratings of the two less preferred displays was unexpected, and we have no satisfactory explanation for it.

The ratings in the Impression condition had a different pattern. A two-way ANOVA of Presentation and Content Desirability for this group revealed a main effect of the Presentation Format (p < .001) and an interaction effect of Content Desirability and Presentation (p < .05). Separate analyses of the content desirability effects for each of the different display formats revealed that the effect was significant for the 2.5D graphs (p < .001), where ratings of desirable information were higher than ratings of neutral or undesirable information. This result provides only partial support for H2b.

In summary, the ratings of the presentation formats were similar in the decision groups, but differed in the impression group. This is in line with the results of Experiment 1. The participants in both decision groups reacted to changes in content desirability by substituting their preferences between the 3D graph and the table—the two least preferred formats. In the impression group, on the other hand, the desirability of the displayed information mainly affected the ratings of the 2.5D graphs, and to some extent the 2D graphs as well. In addition, the mean ratings of
the four display formats were the lowest, and the differences between the four display formats were the smallest for data with negative content desirability in the impression condition. Evidently, under this specific condition, presenters were least satisfied with conventional presentation formats. This might reflect their disappointment with the available presentations formats, which did not enable them to satisfactorily impress others given the negative content of the message. Alternatively, this could reflect a belief that regardless of the presentation format, it is very difficult to impress with “bad news.”

**Experiment 3**

**Rationale and Hypotheses**

The results from Experiments 1 and 2 indicate that people's preferences for presentation formats depend on the objective of the presentation and, to some extent, on the desirability of the message content. People differentiate between presentations that facilitate decision making and those that help to impress other people. In addition, people prefer to present information in different formats, depending on the desirability of the message. However, participants in these experiments saw only four presentation formats. State-of-the-art software packages allow users to choose from a much wider set of formats. Thus, it could be argued that the first two experiments were too constrained in terms of the presentation formats that people had at their disposal. Possibly, rather than indicating actual preferences, some of the findings could have resulted from this constrained set of presentation formats. In Experiment 3, we tried to alleviate this potential problem by allowing users to create the presentation by themselves. In designing Experiment 3, we took into account that in Experiments 1
and 2 no differences were found between preferences for presentation formats under the two decision conditions (to others and to oneself). Therefore, the third study focused on the differences between the two basic objectives of information presentation: decision vs. impression. Since impression is relevant only when presenting to others, we chose an experimental design that compared the impression condition with a condition of decision by another person. Thus, the experiment was designed to test Hypotheses 1b, 2a, and 2b, but unlike the previous experiments, the participants in this study were not constrained by a predefined set of presentation formats.

**Method**

**Participants.** The participants were 81 third-year engineering students with good software skills and experience in using Microsoft Excel, the software used for this experiment. The students received class credit for their participation in the study.

**Procedure.** The two scenarios that manipulated the Objective factor were basically identical to the ones used in the previous experiments to manipulate the presentation’s objective. We modified the wording of the manipulating sentence to emphasize the difference between the two scenarios. In the decision scenario, the sentence read: “It is very important to you that the CEO will be able to make the best decision as soon as possible since his time is scarce and the quality of his decisions will determine the company's future.” In the impression scenario, the sentence was: “It is very important to you that the CEO will be most favorably impressed with your division’s performance because a meeting about a considerable improvement in your salary is expected next week.”

Each student received both scenarios and was asked to prepare a hard copy report (printed on a monochrome printer). Students were assigned to one of three conditions of Content Desirability (operationalized as trend of sales) identical to those in Experiment 2. To assure that students worked independently, 15 different data sets were generated for each Content Desirability condition. The data sets were based on linear transformations of the initial data series that were used in the previous experiments. The data sets were randomly assigned to the participants.

**Dependent Variable.** The dependent variables in Experiment 3 were the format of presentation used for each scenario (e.g., bar graph, line graph, pie chart, and table) and the dimensionality of the presentation (e.g., 2D, 2.5D, and 3D).

**Results and Discussion**

Two independent raters—one of the authors and a graduate student—evaluated the reports according to two predefined categories: format of presentation and presentation dimensionality. Each rater coded all reports according to the predefined coding scheme. Four Kappa coefficients for interrater agreement were calculated (for two categories in each of the two different scenarios). The four Kappa values ranged between .88 and .94, indicating high interrater agreement. Disagreements were discussed and settled by the two raters. The results of the evaluations for the two presentation scenarios are presented in Table 3 (for type of presentation) and in Table 4 (for presentation dimensionality).

**Testing the Effect of Presentation Objective:** The presentation objective affected the participants’ choice of the presentation format (Table 3) and the dimensionality of the presentation (Table 4). In the decision scenario, there was strong preference for bar graphs (72%) whereas in the impression scenario, the preference for bar graphs decreased (to 44%) and preferences for other presentation formats increased. Compared to the decision scenario, participants used considerably more 3D graphs and less 2D graphs in the impression scenario. These results provide additional support to H1b, namely that presenting to impress results in a different type of presentation than presenting to facilitate efficient decision making.

**Testing the Effect of Content Desirability:** The effects of Content Desirability, as expressed in H2a and H2b, were tested on the two dependent variables (presentation format and dimensionality). For each presentation objective, Figure 4 shows the frequency of presentation formats used by the participants under each category of Content Desirability. The results for each objective were then analyzed separately for content desirability effects, using a Chi-square test of...
Table 3. Categorization of 81 Reports by Presentation Format and Objective (Experiment 3)

<table>
<thead>
<tr>
<th>Presentation Form</th>
<th>Decision Scenario</th>
<th>Impression Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Graph</td>
<td>58</td>
<td>36</td>
</tr>
<tr>
<td>Line Graph</td>
<td>22</td>
<td>29</td>
</tr>
<tr>
<td>Pie Chart</td>
<td>—</td>
<td>12</td>
</tr>
<tr>
<td>Table</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>—</td>
</tr>
</tbody>
</table>

After combining the last three presentation categories, the difference between the objectives is significant at $p < .001$ ($\chi^2 (2) = 19.34$)

Table 4. Categorization of 81 Reports by Presentation Dimensionality and Objective (Experiment 3)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Decision Scenario</th>
<th>Impression Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D</td>
<td>56</td>
<td>36</td>
</tr>
<tr>
<td>2.5D</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>3D</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Other</td>
<td>—</td>
<td>1</td>
</tr>
</tbody>
</table>

After combining the last two dimensionality categories, the difference between the objectives is significant at $p < .001$ ($\chi^2 (2) = 32.79$)

association between Content Desirability and choice of presentation format. In accordance with H2a, Content Desirability had no effect on the choice of the presentation format in the decision scenario ($\chi^2 (4) = 5.32, p = .26$). In accordance with H2b, Content Desirability had a significant effect on presentation format in the impression scenario ($\chi^2 (4) = 36.60, p < .001$). This effect was mainly due to a decrease in the use of bar graphs and line graphs in the impression scenario when negative content was presented.

To test whether the interaction of Objective and Content Desirability affected the participants' choice of presentation dimensionality, the graphs that provided depth cues (2.5D and 3D) were collapsed into one category. For the purpose of this analysis, we ignored presentations that used tables because these are inherently two-dimensional. The results are shown in Figure 5, which depicts the use of depth in presentations as a function of Content Desirability. Presenters in the decision condition used depth-enhanced presentations less frequently, regardless of the desirability of the data. In the impression condition, on the other hand, depth enhancement was more pervasive, especially when the data was undesirable.

We compared the proportion of presentations that used depth when the content was negative to the proportion in the combined neutral and positive content categories. In accordance with H2a and H2b, the difference between the two percentages was not significant in the decision condition, while in the impression condition the difference was significant at $p < .05$. Evidently, when the data is undesirable, the participants opted for more depth in their graphs when they wanted to impress others.

Additional Observations: In addition to the effects of the Objective and of Content Desirability on the choice of presentation formats and their dimensionality, we observed other ways in which presenters seemed to react to these contingencies. First, in the decision condition, all participants presented information as raw values. However, in the impression condition, 16 participants presented information as

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percentages rather than quantities. Twelve of those 16 were in the negative content condition. This tendency is related to the more frequent use of pie charts in the impression condition in general (12 cases overall), and especially under the negative content condition (11 cases out of those 12). The tendency not to use pie charts except under this condition suggests that the participants might be aware (at least implicitly) of what constitutes good graphics in general. It appears that they are generally in agreement with Tutte’s opinion on pie charts: “the only worse design than a pie chart is several of them” (Tutte 1983, p. 178). Thus, only in a situation dominated by the need to impress, coupled with the inability to do so on the most relevant attribute (i.e., job performance), do people use gratuitous graphics—3D and pie charts—excessively.

To conclude, Experiment 3 showed that in the impression condition presenters’ preferences were different from those in the decision condition. Also, in the impression condition participants exhibited increased preferences for depth cues, and presentation preferences were affected by the desirability of the presented information. Presenters tended to use fewer bar graphs in the impression condition than in the decision condition. The bar graphs were replaced by line graphs in the desirable condition, and by pie charts in the undesirable condition. In addition, the impression condition induced more 3D graphs than the decision condition, especially when the information was unfavorable.
Final Discussion

This study differs from previous research in the area of information presentation in several respects. First, whereas most studies and theories to date concentrated on information presentation from the receiver’s standpoint, this study investigated it from the presenter’s perspective. We argue that, given the social context that often surrounds information presentation, it is impossible to ignore the presenter’s motives and agenda. Hence, this research reverses the causal scheme used thus far in information presentation research. Instead of examining presentations as an independent variable that affects decision makers, this study treats it as a dependent variable at the service of organizational agents. Second, previous research on information presentation tended to be prescriptive, trying to identify what presentation formats should be used. This study is descriptive. It deals with what presentation formats people tend to use. Third, traditional research in the field views information processing as the relevant human capacity in determining usage of information presentations. The current study, on the other hand, concentrates on social needs as a major determining factor. We suggest that presentation preferences depend on the presenters’ objectives, along with their relations with the presentation’s audience and the desirability of the presented information.

The results of this study support the notion that there is more to information presentation than plain human data crunching. The three experiments provide converging evidence that the social context plays an important role in users’ choice of presentation formats. The hypotheses were that people will choose certain presentation formats when optimal decisions are required and other formats when positive impressions are mainly sought. In addition, the study hypothesized that the choice
Table 5. The Study’s Hypotheses and a Summary of the Results of the Three Experiments

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Exp. 1</th>
<th>Exp. 2</th>
<th>Exp. 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: There will be no difference in the pattern of presentation preferences between presentations for decision making by oneself and presentations for decision making by others.</td>
<td>Supported</td>
<td>Supported</td>
<td>Not tested</td>
</tr>
<tr>
<td>H1b: Presenters whose objective is to impress others will have different presentation preferences than presenters whose objective is to present for optimal decision making.</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>H2a: There will be no effect of content desirability when the presentation objective is optimal decision making.</td>
<td>Not tested</td>
<td>Partly supported</td>
<td>Supported</td>
</tr>
<tr>
<td>H2b: Presenters who try to impress others will have different presentation preferences, depending on the content desirability of their presentation.</td>
<td>Not tested</td>
<td>Partly supported</td>
<td>Supported</td>
</tr>
</tbody>
</table>

of the presentation formats for impression management is affected by the desirability of the presented information. A summary of the hypotheses and the experimental results is presented in Table 5. Evidently, the results illustrate the viability of the social context perspective of information presentation.

In contrast to the claim by Levy et al. (1996) that the main factor that determines presentation preferences is whether the presentation is for one’s own use or for the use of others, this study demonstrates that the difference lies in how we intend other people to use our presentation. A presentation that is intended to facilitate others’ decision making will not be different from one that we prefer for our own use. The difference surfaces when we strive to impress our audience. Then the use of gratuitous graphics becomes more prevalent, and the “chartjunk” becomes a potential “goldgraph.”

Our second finding was that the degree to which the information that we present “speaks” for us also determines how we prefer to present it. Consistent with the “self-promotion” strategy of persuasion (Jones 1990), users tend to employ gratuitous graphics more when the information they present speaks against them. People seem to self-promote by means of boasting the appearance of their presentation, or, as some of the participants in Experiment 3 did, by constructing the data in such a way that it will conceal the unfavorable data or even transform them into virtual success stories. These results resemble O’Reilly’s (1978) finding that unfavorable upward messages tend to be more distorted than favorable ones.

It would be naïve to assume that impression management strategies are the only link that bridges academic proscriptions of gratuitous graphics and presenters’ actual use of them. It has been noted that the selection and use of a message strategy in an influence attempt may depend on a wide variety of personal characteristics, as well as situational, organizational, and relationship factors (Jablin and Krone 1994). For example, the quest for visual aesthetics may overwhelm rational evaluations of the efficacy of information technology (Tractinsky 1997).

Thus, while self-impression behavior can account for the results of our experiments, other underlying motives should be considered as well. For example, it is possible that people will
restrain from using elaborate graphic techniques when the content is not desirable because this would attract attention to the presented information. For this very reason, people who present desirable information might opt for glitzy presentations. The results of the experiments, however, do not support this line of reasoning. An alternative explanation, which does correspond to the data, suggests that gaudy presentations serve to divert attention from the displayed information to its presentation format. The gratuitous graphics are used as "camouflage" of the actual content, when it is negative from the presenter's point of view. Another possible explanation for why people tend to use gratuitous graphics when the content of their presentation is undesirable is that presenters might have a naive notion that display of competence in one area might project to competence in other areas (e.g., job performance). Clearly, more research is needed to assess the validity of these potential explanations.

**Limitations**

This study addresses information presentation research from a new perspective. As such, it suffers from certain limitations that characterize exploratory studies. Despite our interest in the social context of behavior, the experiments reported in this manuscript were obviously not set in a "real world" social context. It is often argued that such experiments cannot serve as a reliable surrogate for real world context. We will not reiterate the arguments for and against the use of controlled experiments in MIS research (cf., Mason 1989). Rather, we would like to point out that, similar to our approach, much of the progress in the field of interpersonal perception has been made by virtue of using controlled experiments (Jones 1990). In addition, we argue that setting the experiments in a relatively sterile environment is more likely to reduce social context effects rather than to increase them. Thus, it appears that the effects found in this study are indicative of effects of at least similar magnitude that one can find in the real world.

Given the multiplicity of social conditions and presentation formats, it is only natural that we were not able to account for all possible scenarios or to control for every potential factor. For example, in Experiments 1 and 2, the order of the presentations was not counterbalanced or randomized to test, or control, for order effects. Thus, one might argue that the relative preference of the presentation formats is an artifact of the order in which they were presented. However, we would like to emphasize that our main concern in this study is not the ranking of presentation formats in general, but rather how people change their preferences as the social conditions change. This purpose was not affected by the fixed order of presentation formats in Experiments 1 and 2.

The wording of the objective manipulation in Experiment 3 was somewhat stronger than in the previous experiments. This was done to increase the effect of the manipulation because the sample size was limited relative to the other experiments, as was control over the participants' responses (recall that there were no restrictions of the presentation formats they could generate). Despite these changes, however, the results were consistent across experiments (see Table 5), indicating the robustness of the findings. However, as with many social-context phenomena, changes in context may elicit different presentation preferences. Thus, further studies are needed to explore how the context affects presentation preferences.

Experiment 3 employed a within-subject design of the Objective factor. The statistical analysis was unable to take this fact into account. Thus, some caution is in place when interpreting the experiment's results. A more controlled experiment is needed to replicate the results of this experiment.

Another limitation of this study is the confinement of the data sets to two data series with five data points in each. Obviously, further research is needed to affirm the findings of this study given different combinations of data sets.

**Implications for Practice**

Recognizing the choice of presentation formats as a means for impression management has practical implications at a number of levels. This study demonstrates that there is a general tendency to use "gratuitous graphics" when attempting to create favorable impressions. Organizations that want to maximize the rational value of the information presentation and minimize its impression management aspect may
need to consider prescribing the use of display formats that are most suited for decision support, while limiting the use of distracting graphic practices. In addition, the training for corporate managerial positions should include instruction on the use of information presentation. In particular, the skill of detecting misleading or uninformative graphic methods should be taught. It managers are able to identify these practices, their use becomes less likely, since impression management techniques cease to have the desired effect once they are recognized.

On the other hand, organizations should weigh the negative effects of such interventions on the delicate social fabric of organizational life. Self-presentation serves social needs and is done in a social context. Its suppression in one context may lead to its emergence in other circumstances. It may lead presenters to resort to other, perhaps even less desirable, ways of manipulating the presentation (e.g., distortion), and it may disturb the organizational communication system, challenging established norms and values. Eventually, over-rationlalizing the communication patterns in organizations may produce organizational dysfunction (Katz and Kahn 1966) instead of the intended effect. Thus, the issue raised here is intricate and deserves the organization’s attention. It involves considerations of efficiency, trust, creativity, and ethics, to name a few. As is often the case in such matters, it is impossible to prescribe simple organizational policies vis a vis information presentation practices, except for increased awareness of these practices.

**Implications for Research**

Very little research was conducted to date on the use of information presentation from the presenter’s perspective. Obviously we are not yet able to specify the determinants of impression formation. To what extent are they related to visual characteristics of the display, to the use of new technical features to which the viewer is yet unaccustomed, to the overload with visual information while hiding the relevant information, or to other factors? For example, one interesting aspect of the self-promotion strategy is the “self-promoter’s paradox” (Jones 1990). The paradox is based on the fact that good performance often speaks for itself. Thus, good performers who can readily self-promote have a reduced need to claim competence. This might explain, to some extent, the lesser tendency of participants in the Impression/Desirable Content condition to use redundant depth cues in their presentations. Poor performers, on the other hand, cannot indefinitely substitute claims for performance, because people naturally want to link claims with concrete evidence of actual performance. Consequently, poor performers who use self-promotion run the risk of being exposed for what they really are, while good performers don’t need to self-promote. In this study, participants in the Impression/Undesirable Content condition used more “chartjunk” elements (e.g., depth cues, pie charts) than participants in other conditions. It would be interesting to test the presentation preferences of such users in a more dynamic setting in which the discrepancy between actual performance and aspiring presentations can affect the interactions between presenters and receivers.

Social psychology phenomena are susceptible to cultural biases (Berry et al. 1992), and our findings regarding the use of information presentation as a self-promotion tactic may also be culturally dependent. Cross-cultural comparisons of impression management via information presentation will have theoretical value and will also be of major practical importance, considering the ongoing trend toward globalization and the multi-cultural nature of many corporations. Hofstede (1994, p. 79), discussing his masculinity/femininity dimension of cultural differences, contrasts the behavior of Dutch and American job applicants. According to Hofstede, the behavior of the American applicant, characterized by active impression management, is typical of masculine societies. The lack of self-promotion attempts by the Dutch applicant is more typical of feminine cultures. Possibly, self-promotion and its effects on information presentation may be more evident in masculine societies than in feminine ones.

Another research issue involves the relations between what actually impresses people and what presenters think impresses other people. To what degree are presenters’ intuitions and beliefs accurate? To what degree do people form their preferences of what to display to others based on what impresses them?
In addition, the limits of the use of presentation techniques are still unclear. Under what conditions will these techniques fail and when will they still be useful? Do gratuitous graphics and impressions relate linearly (that is, the more gaudy the presentation the better the expected impressions)? Do people expect the benefits of gratuitous graphics to level off or to curve down at some point? Clearly, considering the information presentation from the perspective of the presenter opens a wide range of future directions for research that may have a major impact on communication techniques in organizations.

Conclusion

Information presentations are communication means, used both by the presenter and by the viewer. Viewers and presenters use various criteria to assess the adequacy of the presentation, based on different objectives and expectations. The gap between the viewer's and the presenter's criteria and objectives is resonated by the discrepancy between the research and the practice of information presentation. Previous research in the area of information presentation tended to concentrate on the viewer's objectives and criteria. Specifically, it was guided by considerations of efficient decision making. This research focused on the presenter's perspective. From this perspective, efficient decision making by others is often only secondary to the presenter's social needs of recognition and appreciation. This study demonstrates that the presenter's objective influences the choice of information presentation. People tend to use more gratuitous graphics when they want to impress than when they want to facilitate decision making. The study also showed that presenters are conscious of the desirability of the information they present when they try to impress. They appear to use more modest presentations when they present favorable information, but revert to gratuitous graphics when the information is undesirable.

This study suggests that, to capture the complexity of information usage in actual settings, both the presenter’s and the viewer’s perspectives should be taken into account. Only by taking this approach can we attempt to reconcile the contradictions between the scientific research findings and the recommendations in the literature on the one hand and the de facto business practices of information presentation on the other hand.

Acknowledgements

We would like to thank the associate editor and an anonymous reviewer for their constructive comments during the review process.

References


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**APPENDIX A**

**Presentations Used for Experiment 1**

(Labels of the presentation formats, as used in the paper, are given on the right side. These labels were not displayed in the experimental material.)
Super-Knowledge Co.
Division A's sales for the last five months

2D Graph

Super-Knowledge Co.
Division A's sales for the last five months

2.5D Graph

Super-Knowledge Co.
Division A's sales for the last five months

3D Graph
APPENDIX B

The Three Experimental Scenarios

In the first scenario, participants assume the role of a CEO who looks for information in order to make a decision.

“You are the CEO of the Super-Knowledge company for advanced products. For the purpose of making a decision about the production policy in Division A, you ask the Division’s Head to provide you with a monthly report, presenting the sales of Product 1 and Product 2 of his division during the last five months. You want to make the best decision as quickly as possible. Below are four different presentation types of the same data that the information system of Division A can provide. Which of the four presentation types will you choose for presenting the data?”

In the second scenario, participants are supposed to provide information to enhance their CEO’s decision making.

“You are the head of Division A of the Super-Knowledge company for advanced products. For the purpose of making a decision about the production policy in the Division, you are to provide the company’s CEO with a monthly report, presenting the sales of Product 1 and Product 2 of your division during the last five months. You want the CEO to make the best decision as quickly as possible. Below are four different presentation types of the same data that the information system of Division A can provide. Which of the four presentation types will you choose for presenting the data?”

In the third scenario, participants assumed the role of a division manager who is trying to impress his/her CEO.

“You are the head of Division A of the Super-Knowledge company for advanced products. For the purpose of making a decision about the production policy in the Division, you are to provide the company’s CEO a monthly report, presenting the sales of Product 1 and Product 2 of your division during the last five months. You want the CEO to get the best impression of your division’s performance. Below are four different presentation types of the same data that the information system of Division A can provide. Which of the four presentation types will you choose for presenting the data?”

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