APPLIED THEORY

SUMMARY

- Argues for a significantly different design of presentation slides that is particularly well suited to technical presentations
- Outlines the key advantages and challenges of this design, and assesses attempts to disseminate it

Rethinking the Design of Presentation Slides: A Case for Sentence Headlines and Visual Evidence

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INTRODUCTION

The next presentation slide or overhead transparency goes up, and the audience immediately gives it their attention. Does the audience quickly grasp the main assertion of what is projected? Does the projection actually help the audience understand and retain the material? If the slides are distributed as sets of notes, do those notes serve the audience weeks later?

If the slide is designed using the traditional phrase headline supported by a bulleted list and is being used to convey technical material, the answer to all of these questions is "no." For most presenters of technical material, however, the most pertinent question may be "What other design could I possibly use?" This article advocates an alternative design that uses a succinct sentence headline supported by visual evidence to meet the audience's need to understand the technical concepts being presented. This alternative design makes communication more efficient, memorable, and persuasive, and is much better suited to the presentation of technical material than is the traditional bullet list format. Shown in Figure 1 is a contrast between this alternative design and the traditional design.

In technical presentations, projected slides have become a standard feature. Since PowerPoint was introduced by Microsoft in the late 1980s (Wikimedia Foundation 2005), slide designs have become more standardized, in large part because PowerPoint itself is used so pervasively. Experts who follow trends in presentation techniques estimate that PowerPoint is used to make an estimated 20 to 30 million presentations every day and has between 250 and 400 million users around the globe (Goldstein 2003; Schwartz 2003; Simons 2004; Zielinski 2003). Ideally, well-designed slides can emphasize key points, show images too complex to explain in words, and reveal the organization of the presentation.

Unfortunately, the usual design of a phrase headline supported by a bullet list seldom leads to achieving these ideals. We believe that the shortcomings of this design are particularly significant in technical presentations, where achieving a clear mental picture of the phenomenon or device being described is often essential to effective communication. To demonstrate these shortcomings, this article

1. Summarizes the weaknesses of this traditional design
2. Describes the key features and advantages of the alternative design
3. Outlines the challenges of adopting the alternative design
4. Assesses attempts to disseminate this design through lectures, workshops, and the Web

CRITICISM OF POWERPOINT

Over the last three years, criticism of PowerPoint has arisen in a wide range of publications, including the *Harvard business review*, *Wired*, *Presentations*, *Successful meetings*, *The New Yorker*, *The New York times*, *The Chicago tribune*, and the *Times* of London. Not surprisingly, there is also a great deal of discussion about PowerPoint on the Web, most notably on the Weblogs www.edwardtufte.com and www.sociablemedia.com. The titles of the articles reflect both the caustic character of the criticism and the vivid

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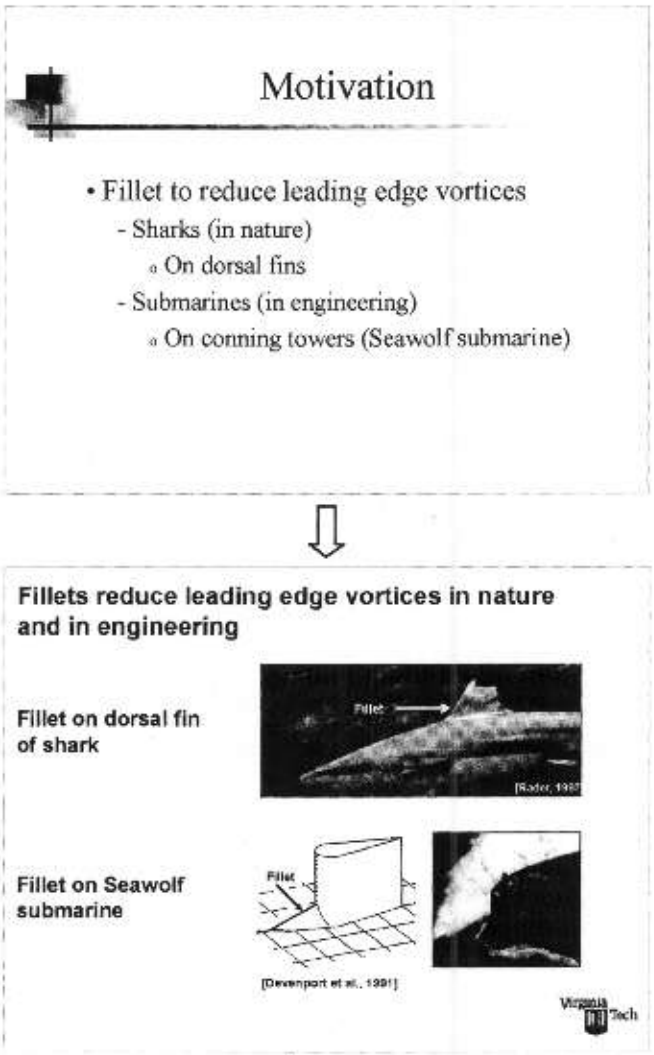

Figure 1. Contrast the traditional design on the top with the alternative design on the bottom (Zess and Thole 2002). In the alternative design, the sentence headline not only identifies the topic (fillets), but also states an assertion about that topic. In the slide's body, images memorably support the headline's assertion.

language used: "Absolute PowerPoint" (Parker 2001); "PowerPoint is evil" (Tufte 2003c); "Is PowerPoint the devil" (Keller 2003); "Does PowerPoint make you stupid?" (Simons 2004); and "Death by bullet points" (Heavens 2004).

Yale professor Edward Tufte, a well-respected expert in the analysis and visual display of quantitative information, is perhaps the most prominent academic critic of PowerPoint (2003a; 2003b; 2003c; 2004). He has voiced a common theme in the criticism of PowerPoint: presentation slides that follow Microsoft PowerPoint's design defaults tend toward reductionism because they oversimplify and fragment the subject matter. Wald and Schwartz echoed these criticisms (2003).

Tufte expanded his criticism of PowerPoint in "The cognitive style of PowerPoint" (2003a). In that essay, he challenges the use of PowerPoint in technical presentations based on the fact that the default styles of PowerPoint limit the amount of detail that can reasonably be presented and often obscure logical connections (or the lack thereof) among facts used to make an argument. In a similar vein, Shaw and colleagues (1998) point out that bullet points "leave critical assumptions unstated" and "critical relationships unspecified."

Perhaps the most common criticism is that presentations using PowerPoint have become overly predictable and generic. John Schwartz (2003) characterized this phenomenon as "PowerPoint's tendency to turn any information into a dull recitation of look-alike factoids." He begins his article by asking, "Is there anything so deadening to the soul as a PowerPoint presentation?" As Goldstein (2003) puts it, the result of pervasive use of PowerPoint is that most presentations look and feel "exactly the same." Moreover, as he states, "originality and content [all too often] get buried."

One underlying theme in many critiques is that speakers have somehow been coerced into using PowerPoint and that audiences must necessarily suffer through it. These critics remind us that a communication strategy can be both ubiquitous and standardized but not be effective.

Another common criticism relates to the excessive or distracting use of the special effects that PowerPoint provides. According to this group, there is a strong tendency for the slides to become the message rather than a means to enrich the message (Goldstein 2003). The dominance of projected slides over the speaker often means that presenters forego an important opportunity to connect with the audience as human beings. Other critics worry that PowerPoint simply covers up deficiencies in the speaker's ability to present (Bell 2004) or creates the appearance of preparation without requiring the speaker to think carefully about the arguments being presented or the strategy that is most suited to presenting a particular subject or piece of work (Simons 2004).

Donald Norman, author of *The design of everyday things*, co-founder of the Nielson Norman Group, and one of the early advocates of user-centered design and simplicity, recognizes that PowerPoint slides can be an extremely effective way to present visual aids, with emphasis on *visual* material—that is, material that cannot easily be conveyed with words. In an interview with Cliff Atkinson (2004), Norman suggests that many of the big problems

with PowerPoint arise when speakers try to use one set of slides to serve as (1) speaker's notes, (2) slides the audience will see, (3) handouts to be studied after the talk, and (4) a substitute for a written paper. Norman's analysis reflects one of the most important principles of effective communication: communication must always be designed with the audience's or reader's needs as a primary focus. The alternative design we propose adheres to this principle.

THE ALTERNATIVE DESIGN

Those who defend PowerPoint also critique the practices outlined above but defend what they usually term "the tool itself" and emphasize the ways in which PowerPoint is a vast improvement over the days when presenters faced lead times of days or weeks for getting slides or transparencies made, depended on "middlemen" such as an in-house staff or Kinko's, and paid very high costs for features such as photographs or color. These defenders, who include sociablemedia.com founder Cliff Atkinson, are probably most accurately described as advocates of what might be termed the "intelligent use" of PowerPoint. The advocates of intelligent use seek to maximize the potential advantages of projected slides while also calling attention to the need for thoughtful design of slides and presentations. One such advocate, Jean-luc Doumont (2005), has presented a strong counter-argument to many of the assertions Tufte makes in "The cognitive style of PowerPoint" (2003a).

The alternative design presented in this article responds to the call for intelligent use, especially with regard to the challenges of using PowerPoint or other presentation software to support the presentation of technical material. Building on a design that originated at Lawrence Livermore National Laboratory (Gottlieb 2002), this alternative slide design also responds to many other criticisms that are likely familiar to anyone who watches significant numbers of presentations.

Two features distinguish the alternative design from the traditional design: the succinct sentence headline as opposed to a phrase headline, and the use of visual evidence as opposed to a bulleted list. Using a succinct sentence headline is not a new idea. Lawrence Livermore National Laboratory has been advocating such a headline since the 1980s. Such a headline responds to the traditional design's failure to clarify the purpose of each slide. Likewise, relying on visual evidence is not new either—many advocates of the "intelligent use" of PowerPoint have made similar calls.

What distinguishes the alternative design is the rigorous application of these two features with specific layout and typography guidelines. These guidelines, which were chosen to make the communication efficient, memorable, and persuasive (Alley, 2003a), have been refined through critique sessions of more than 400 technical presentations given over four years at Virginia Tech.

In these presentations, engineering graduate students and seniors explained and persuaded an audience either about research or about solutions to technical problems (Alley and Robertshaw 2003b). At the end of each critique session, the audience discussed what details from the slides they had comprehended and what details they remembered. Each year, the lessons learned from these discussions were incorporated into the design guidelines taught to the next class of graduate students and seniors (more than 200 each year).

The final product of these four years of critique sessions is the alternative design discussed in this article. Table 1 presents the guidelines for this design. Interestingly, a number of the recommendations that deviate from the traditional design (the sentence headlines, the supporting graphical evidence, and the limitation of text blocks to two lines) mirror what Doumont (2005) independently concluded.

Audience orientation

One advantage is that the design orients the audience significantly better both during the presentation and later when the slides are used as a set of notes. The main reason for this advantage lies with the design's call for a sentence headline (Alley and Robertshaw 2003a). Simply put, a sentence headline has more potential than a phrase headline at orienting the audience to both the topic and purpose of the slide. Illustrating this point is Figure 2, which contrasts a weaker phrase headline in the top slide with a much stronger sentence headline on the bottom slide.

The sentence headline is more effective at orienting the audience to the slide's main point. Unfortunately, in such situations, many technical presenters would choose phrase headlines. While a capable presenter using the top slide in Figure 2 could orient the audience during the presentation to the main result, the slide below works much better with a less experienced speaker, such as a graduate student. In addition, the slide on the bottom is more effective in the long term when the audience utilizes the slides as a set of notes.

Audience retention

A second advantage of the alternative design over the traditional design is that the alternative design is more memorable. The main reason for this advantage lies in the alternative design's call for visually presenting details in the slide's body. Illustrating this advantage is Figure 3, which contrasts a soon-to-be-forgotten bullet list in the traditional slide on the top with a much more memorable visual representation in the slide on the bottom (Robertshaw 2004).

Cognitive psychology research supports this assertion that the visual representation is more memorable. Accord-

TABLE 1: GUIDELINES FOR THE ALTERNATIVE DESIGN OF PRESENTATION SLIDES (ALLEY 2003A)

Style

For every slide, but the title slide, use a sentence headline that states the slide's main assertion; left justify the headline in the slide's upper left corner.

In the body of each slide, present supporting evidence in a visual way—with images, graphs, or visual arrangements of text (such as a table or text blocks connected by arrows).

Avoid bulleted lists because such lists do not show the connections among the listed items.

Limit the number of slides so that at least 1 minute can be spent on each slide (preferably more time in a longer presentation such as an hour seminar).

Typography

Use a sans serif typeface such as Arial (in rooms that seat more than 20 people, boldface that text).

On a typical slide, use 28 point type for the headline and 18–24 point type for the body text (larger type is appropriate for the title on the title slide).

Avoid setting text in all capital letters.

Layout

Keep blocks of text, including headlines, to one or two lines.

Keep lists to two, three, or four items.

Be generous with white space, but give preference to internal white space between text blocks and graphic elements within the slide, as opposed to border white space on the slide's edges (when projected, the white space on the border is often not as noticeable).

Organization

On the title slide, include an image that orients the audience to the talk's subject or purpose.

On the mapping slide, include images that serve as mnemonics for the talk's sections.

End with the conclusion slide because that slide is the most important slide of the presentation.

Compared with the traditional design for slides, the alternative design offers three main advantages at presenting technical information.

ing to Sadoski and Paivio (2001) and Mayer (2001), the audience's retention increases significantly if the audience experiences the information in both verbal and visual ways. Explaining the increase in retention is the dual correlation hypothesis, which Paivio (1986) proposed. This hypothesis states that verbal codes and pictorial codes are

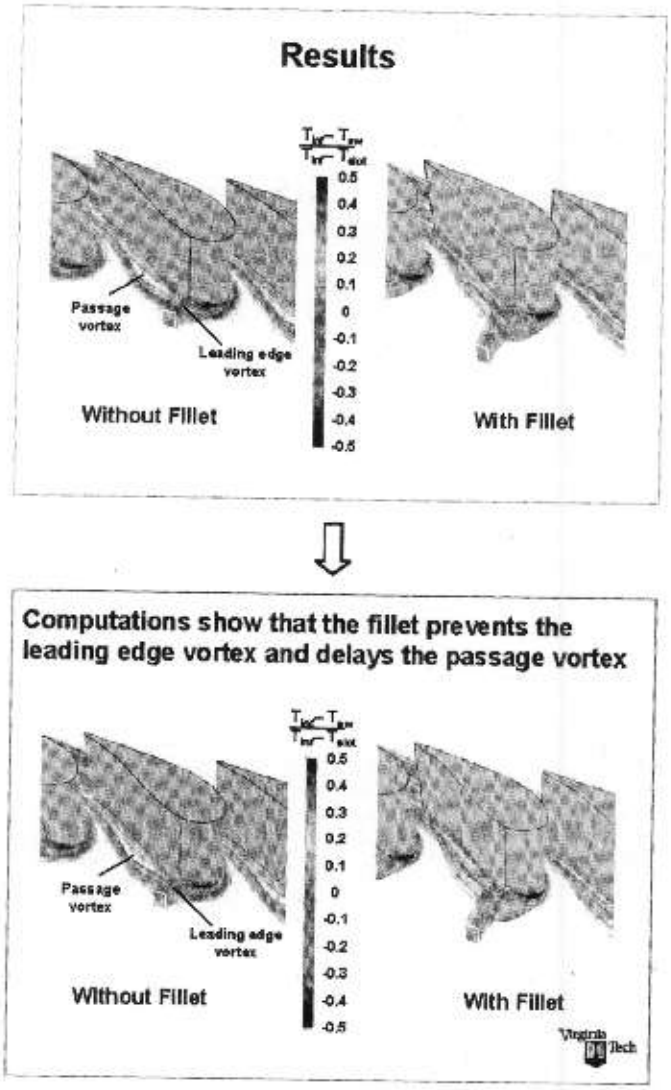

Figure 2. Contrast a slide (top) that uses a phrase headline and a slide (bottom) that uses a sentence headline (Zess and Thole 2002). The sentence headline explicitly states the principal result of the presentation.

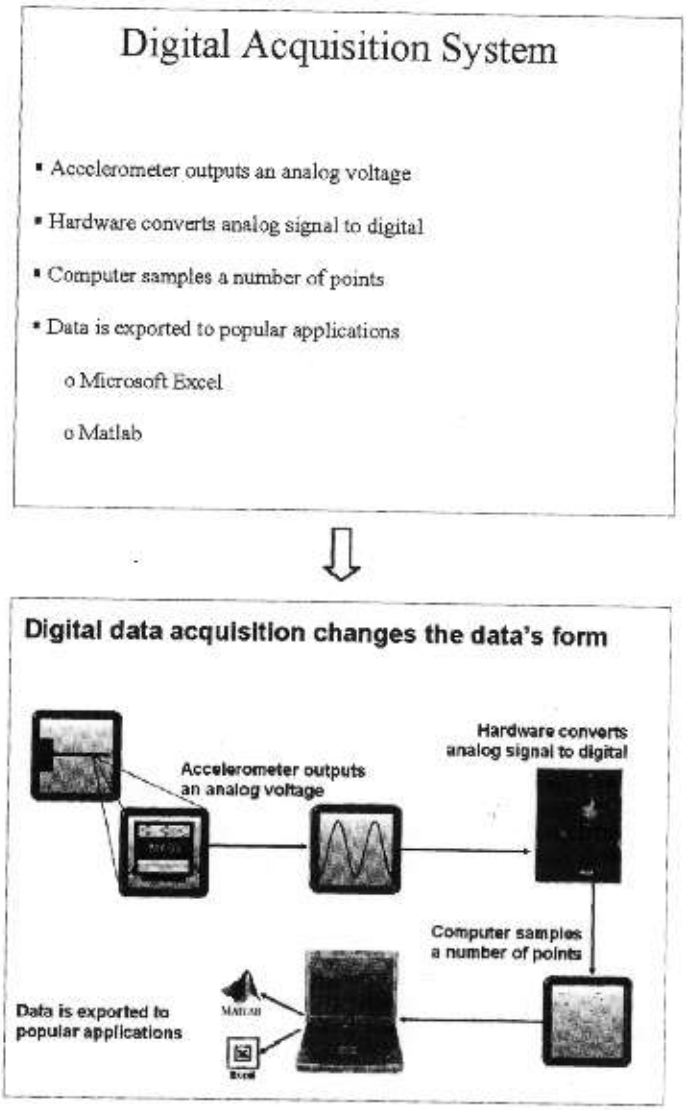

Figure 3. Contrast the traditional slide (top) with a slide (bottom) that uses the alternative design (Robertshaw 2004). The recommended design shows visual relationships among the details. The headline of the alternative design also shows the perspective on the topic.

processed and stored in different ways in the brain. Note that in the slide example of Figure 3, the images serve to represent the work rather than just decorate the slide. As Carney and Levin (2002) point out, representative images increase audience recall, but decorative images, such as the template background art of PowerPoint, do not. In fact, according to Carney and Levin, decorative images actually reduce audience recall.

The example slides shown so far have been from different presentations. What about the relationships of slides within the same presentation? Figures 4, 5, 6, and 7 show examples that reveal the structure of a presentation: the title slide, the mapping slide, a slide from the presentation's middle, and the conclusion slide.

Distinguishing the title slide in Figure 4 is an image that helps orient the audience to the topic being discussed. Distinguishing the mapping slide in Figure 5 is not only the sentence headline that emphasizes the presentation's

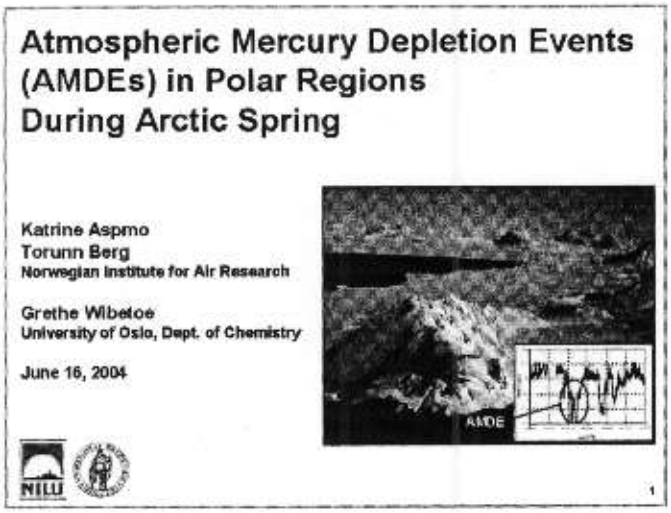

Figure 4. Title slide that uses the alternative design (Aspmo, Berg, and Wibetoe 2004). The image on the slide serves to orient the audience to the topic.

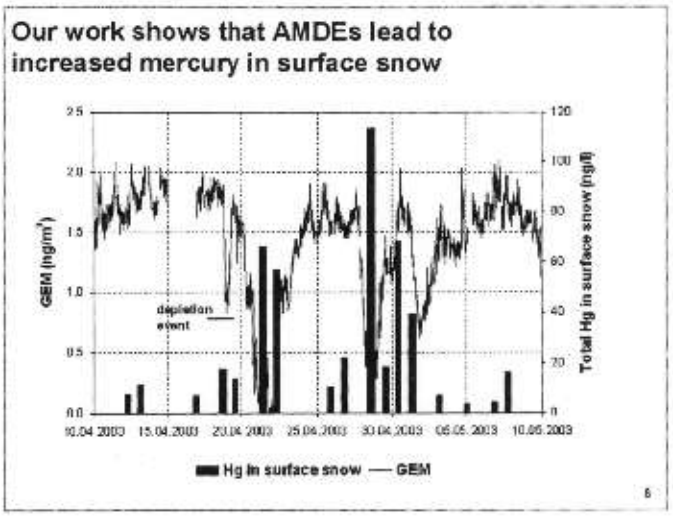

Figure 6. Slide using the alternative design from the middle of a presentation (Aspmo, Berg, and Wibetoe 2004). The sentence headline makes an assertion that the visual evidence in the slide's body defends.

scope but also the inclusion of images for each section of the middle. As Paivio's work suggests (1986), this linking of images with the main sections of the middle is much more memorable than simply listing the topics in a bullet list.

As was mapped by the slide shown in Figure 5, the middle of the presentation has three sections. Shown in Figure 6 is a slide from the second section of that middle. This slide presents the most important result of the presentation—namely, the conclusion that the depletion of mercury in the atmosphere is accompanied by an increase in mercury levels in the surface snow.

The conclusion slide of this presentation, shown in Figure 7, is distinguished not only by the sentence headline that states the main conclusion of the talk but also by the repetition of two key images from the talk: the location for the study shown in the title slide (Figure 4) and the key graph shown in Figure 6. Also distinguishing this conclusion slide from traditional conclusion slides is that the speaker calls for "Questions" from this slide, so that the slide can remain projected during the question and answer

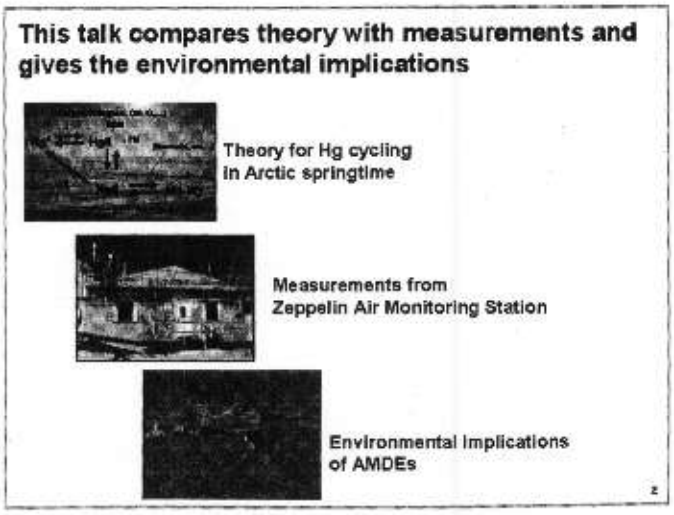

Figure 5. Mapping slide that uses the alternative design (Aspmo, Berg, and Wibetoe 2004). Notice the use of a mnemonic image for each section of the presentation's middle.

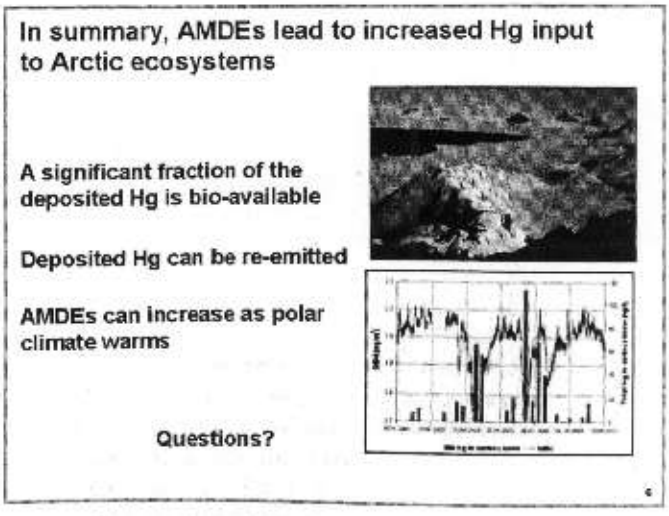

Figure 7. Conclusion slide that uses the alternative design (Aspmo, Berg, and Wibetoe 2004). Key images from the presentation are repeated for emphasis.

period. The justification for this design choice is that the conclusion slide is the most important slide of the presentation—it contains the essential information that the speaker wants the audience to take away from the room.

Persuasion

A third advantage of the alternative design over the traditional design is that the alternative design is more persuasive. This advantage arises from the alternative design's call for sentence headlines. If well chosen, the sentence headlines present the audience with the presentation's assertions and assumptions. Explicitly stating these assertions and assumptions in a technical presentation is advantageous because audiences are more inclined to believe the presentation's argument if they realize the claims (assertions) and warrants (assumptions) of that argument (Toulmin 2003).

In addition, once the presenter has decided on the headline, the presenter is in a much better position to put forward persuasive evidence to support that assertion. Consider, for instance, the evidence brought forward to support the headline assertion in Figure 8. Without the headline that focuses the graduate student's attention on the assertion that needs support, she might not have chosen such cogent evidence.

CHALLENGES TO INCORPORATING THE DESIGN

If the alternative design has so many advantages, why aren't more technical presenters using it? Incorporating the alternative design poses several challenges to the presenter. One such challenge is the writing of a succinct sentence headline for each slide. To write a headline that identifies the main assertion or purpose of the slide, the presenter has to understand the presentation well enough that he or she can state the role of each slide in the presentation.

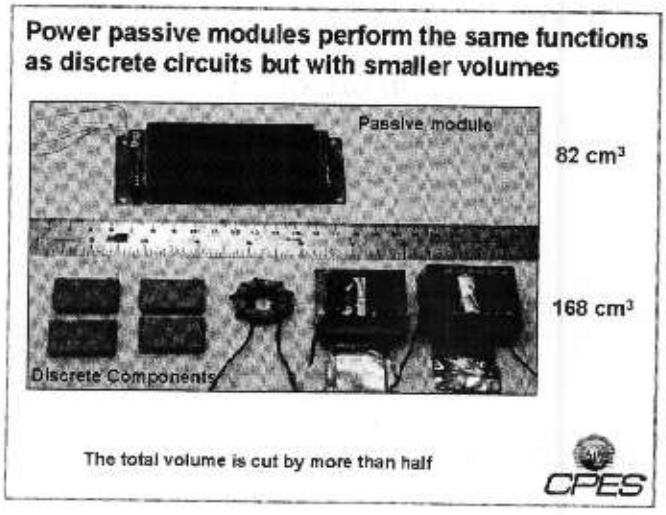

Figure 8. A slide that uses the alternative design (Zhu 2003). The assertion of the sentence headline makes it clear to the presenter what type of evidence is needed in the slide's body.

Not surprisingly, defining the presentation's assertions is difficult for inexperienced presenters. However, defining the presentation's assertions is an unexpected challenge for experienced presenters who have followed the traditional design in preparing many presentations. These presenters have grown accustomed to the relative ease of creating phrase headlines that simply state the presentation's topics. In effect, presenters have to give much more thought to the sentence headlines required by the alternative design. For this reason, a set of these slides is not something that one can create the hour before the presentation.

A second challenge of the alternative design is that adherence to the design requires much effort to overcome the defaults of presentation slide programs, such as PowerPoint. For instance, changing defaults for type choice, type size, placement of headings, and automatic insertions of bullets and sub-bullets in PowerPoint requires many keystrokes and much time for the presenter.

One effective way that we have found to overcome this hurdle has been through using the Web to distribute PowerPoint templates that replace Microsoft's defaults with alternative slide design defaults. This distribution has been successfully used both in professional workshops and in large courses at Virginia Tech and the University of Illinois (Academic Excellence in Engineering Education 2003). These templates are readily available online at a site (Alley 2003c) that Google listed as the top site for the topic *presentation slides* when this article went to press. Nevertheless, users still have to invest time to master this new approach, and many presenters feel that deadlines preclude them from making those investments.

Yet a third challenge to adopting the alternative design is that for every classroom or conference presentation that follows this alternative design, at least 50 others that follow the traditional design are given. That poses a huge challenge for those trying to teach the design. For instance, both Leslie Crowley (2003) at the University of Illinois and D'Arcy Randall (2003) at the University of Texas have claimed that their students put up much resistance to try a slide design that they do not see used in their technical classes. To give instructors the credibility to teach such a different design, testing is needed to show the effectiveness of this design, in relation to the traditional design, in both audience comprehension and audience recall.

ATTEMPTS TO DISSEMINATE THE ALTERNATIVE DESIGN

Since 2001, undergraduates in the Mechanical Engineering Department at Virginia Tech have used the alternative design in a laboratory course sequence that begins in the

second semester of the junior year and ends in the first semester of the senior year. Unlike the situations mentioned at the University of Texas and the University of Illinois, the slide design is considered the norm in this course sequence. Faculty members use the design in their own teaching slides and spend class time teaching the design to students. Moreover, the students are challenged in their assignments any time that they rely on phrase headlines and bulleted lists. Thus, it is not surprising that almost all the student presentations in this course sequence follow the alternative design.

More interesting is the interest that other departments and institutions have shown in the design. Spawned by the successful presentations of these mechanical engineering students and the need for something superior to PowerPoint's defaults, many departments and institutions have requested lectures on the new design. At Virginia Tech, these departments include Industrial Engineering, the Center for Excellence in Undergraduate Teaching, Computer Engineering, Civil and Environmental Engineering, Electrical Engineering, Biological Systems Engineering, Human Development, and Geology. In addition, several other universities have invited guest lectures on this design in the past four years: MIT, the University of Texas at Austin, the University of Illinois at Urbana-Champaign, Seattle Pacific University, the University of Texas Medical Branch, the University of Barcelona, and the University of Oslo.

That so many groups have requested and paid for presentations on this alternative design in so short a time points to widespread dissatisfaction with the traditional use of PowerPoint and to the alternative design's potential for achieving a much more satisfactory result.

In addition to requesting lectures, several institutions have requested workshops that included critique sessions for the participants: United Technologies, Los Alamos National Laboratory, Sandia National Laboratories, Simula Research Laboratory, the Environmental Protection Agency, and several research centers at Virginia Tech. Interestingly, a survey reveals that three months after these workshops, many continue using the design (Alley 2004). The results of the survey are shown in Table 2.

Why has this alternative design generated so much interest? After all, a similar but less specific version of this design came out of the national laboratories in the 1980s (Gottlieb 2002). One reason for the interest in the alternative design lies in the relative ease with which presenters can create representative images for visual evidence in the slide's body today. Digital cameras, the Web, and computer graphics programs make it much easier for presenters to find or create images that truly represent the work. Before these tools, presenters often had to rely on clip art to visually represent the work, but clip art undercuts the seriousness of the presentation and the credibility of the presenter (University of Minnesota and 3M 1985).

A second reason for the interest lies in the use of the Web to distribute templates that change the problematic defaults of Microsoft PowerPoint, the most widely used program to create presentation slides. The templates distributed from http://writing.eng.vt.edu/slides.html (Alley 2003c) make it much easier to adopt the design.

A third reason for the widespread interest is that the alternative design was introduced to several large classes—

TABLE 2: RESULTS FROM SURVEY OF 62 PROFESSIONALS, FACULTY, AND GRADUATE STUDENTS ON THE USE OF THE ALTERNATIVE DESIGN (AT LEAST THREE MONTHS AFTER LEARNING THE DESIGN)

Continued use of sentence headlines	All slides	Most slides	Some slides	No slides
	32%	35%	26%	7%
Continued use of visual evidence	**All slides**	**Most slides**	**Some slides**	**No slides**
	37%	45%	18%	0%
Audience reaction to alternative design	**Mostly receptive**	**Somewhat receptive**	**Mixed reaction**	**Somewhat or mostly averse**
	57%	18%	21%	4%

each with more than 200 students. In effect, this large number of students created a "critical mass" of examples that was large enough to sway faculty and students to accept the design. Many faculty and students saw not just one presentation that used the design, but several.

The alternative design has also been taught in the School of Engineering and Applied Science at the University of Virginia. During the Spring 2004 semester, 60 students in a range of engineering disciplines were exposed to criticisms of the traditional design and were encouraged to use the alternative in the oral presentation of their undergraduate theses. They were also encouraged to reflect on their experience as presenters and audiences of PowerPoint presentations. The students' reflections reveal that resistance to the alternative design is rooted in convention and an unrecognized dependence rather than critical reflection. Exposing students to both the critiques of the conventional use of PowerPoint and the specific advantages of the alternative design puts them in a better position not only to understand and accept but also to articulate and defend an unconventional but superior design.

CONCLUSIONS

This article has advocated a rethinking of the design of presentation slides in technical presentations. Given how often presenters use slides in technical presentations, such consideration is warranted. Through examples and through references to research in cognitive psychology, this article has shown the advantages of an alternative design for presentation slides. Many of these advantages arise from the design's short sentence headline that states the main assertion of the slide. Other advantages arise from using visual evidence, as opposed to a bullet list, to support that headline.

The challenges that presenters face when adopting the alternative design have thus far prevented widespread incorporation of the alternative design. In essence, the alternative design demands much more thought and effort from the presenter than the traditional design does. Still, the alternative design has been taught successfully to professionals and students at various institutions. This success has arisen from several sources, one of the most important being Web distribution of templates that change the weak defaults of PowerPoint.

For the alternative design to achieve widespread use, testing needs to determine the effectiveness of the design in terms of both audience comprehension and audience retention. Should testing confirm that the alternative design is significantly more effective in allowing audiences to comprehend and retain the information, more presenters will be able to see that the advantages of using this alternative design outweigh the challenge of its adoption. TC

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