

CONSTRUCTING EFFECTIVE ORAL PRESENTATIONS

An electronic presentation is the visual companion to the verbal component of a scientific presentation. As such, a poorly constructed electronic presentation can cripple an otherwise excellent speaker. Speakers need to carefully consider the design, construction, and delivery of the slides, topics to be covered in this chapter.

Bashing PowerPoint seems to be all the rage. Whether through phrases (“Death by PowerPoint,” “PowerPoint Phluff”), magazine articles (“PowerPoint is Evil”), music videos [“Power(Point) Ballad”], or books (*Why Most PowerPoint Presentations Suck*), people love to spew their frustration with bad presentations at Microsoft’s software.

Is it fair to criticize electronic presentation software (which, here, includes Keynote, Beamer, LaTeX, Impress, etc., what Edward Tufte calls slideware)? Not really. Blaming slideware for people enduring bad presentations is equivalent to blaming all table legs for stubbed toes.

Indeed, we have all been subjected to boring slideware presentations, but previously we were subjected to roughly the same percentage of bad overhead transparencies or bad chalkboard experiences. Thus, we understand: it’s not the tool, it’s how you use it. Regardless of the medium, a majority of speakers demonstrate a lack of forethought, preparation, and expertise in constructing their presentation.

This chapter looks at how to plan and create clear and effective slides to support your oral presentation. In Section 7.4, the writing/editing funnel described the means to approach writing and editing from the largest scale to the smallest scale. Although not an exact analogy, a similar funnel could be envisioned for presentations. The largest scale would be the storyboard for the presentation, the overall organization, and flow. The next largest scale would

NOT ALL SITUATIONS REQUIRE POWERPOINT

Some companies have banned electronic presentations in their meetings because, in the time people spend creating their graphics, connecting the laptop to the projector, and making the presentation, they could simply have just talked. Slideware has made it easier for us to communicate scientific results in an organized, clear, and colorful way, but it is not the only way. Some situations may be suited for simple oratory, instead.

Imagine if Abraham Lincoln had given the Gettysburg address by PowerPoint. Peter Norvig did. Over 1.6 million people have viewed it, the *Wall Street Journal*, *Lancet*, and *The Guardian* have cited it. The title of one slide was labeled, “Review of Key Objectives

& Critical Success Factors” and contained the sub-bullets: “New birth of freedom” and “Gov’t of/for/by the people.” In the real Gettysburg Address, Lincoln said, “The world will little note nor long remember what we say here.” If he used PowerPoint instead, maybe the world *never would have* remembered.

The speaker before Lincoln spoke for two hours. In two minutes, Lincoln was able to honor the fallen soldiers, dedicate the cemetery, and resolve to give the fledgling United States a new birth of freedom, all in the same number of words of a typical abstract of a scientific journal.

Before you sit down to your computer, decide if you really need PowerPoint, or whether you could obtain more *power* by making your *point* some other way.

be the layout of the individual slides, followed by graphics, text, and the fine points of the aesthetics. Let’s begin at the largest scale.

25.1 STORYBOARD YOUR PRESENTATION

The term *storyboard* comes from the entertainment industry and is the planning by which the scenes of a movie are illustrated on separate sheets of paper and arranged to display the entire shooting sequence. Done this way, scenes can be rearranged and revised to develop the plan for filming. A director skipping storyboarding would have to shoot the movie without knowing where the scenes would be filmed or in what order, let alone details such as the camera position.

Although most directors would not imagine filming scenes of a movie without storyboards, most speakers prepare electronic presentations without even the thought of creating a storyboard. How often do we receive an invitation to speak and our first step is to launch slideware and begin composing without even planning the presentation? Instead, we ought to slow down, think about the presentation, and sketch out the storyboard without even turning on our computers.

The time spent storyboarding pays off later. Usually, too much time is wasted working and reworking slides before the message is even honed. Story-

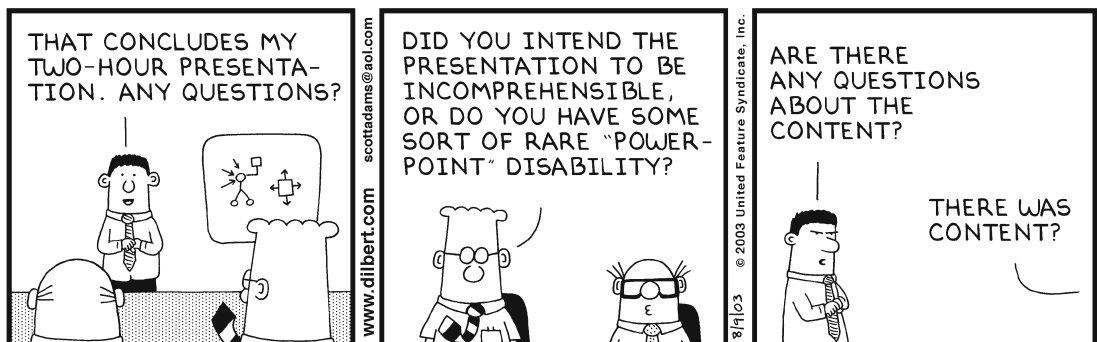
boarding also eliminates the need to repetitively switch between views of the whole slide show (to display and organize the overall structure of the presentation) and the views of the individual slides (to edit individual slides). This unnecessary switching is tiresome, especially in a presentation file with a large number of slides. Thus, efficiency demands creating the slides only after storyboarding is completed.

Most importantly, storyboarding forces you to focus on the theme and content of your presentation (the difficult part) rather than on the style and visuals (the easy and fun part). Your storyboard can be as specific or as general as you prefer, but the process of articulating on paper the structure to your presentation is easier than doing it in the slideware.

Create the storyboard with explicit drawings of each slide. Lay sticky notes or index cards for each slide on a wall or on a conference table. Having each slide displayed separately allows the organization to be worked and reworked to tell the story in the most sensible order. Focus on the message, the content, and the order of the slides to tell the story. Details such as the specific graphics, background color, and style can be refined later. Simply put, storyboards do not require a lot of detail on each slide because they should mimic the final presentation—simple and relevant.

25.2 STARTING TO CONSTRUCT YOUR PRESENTATION

After the storyboard is complete, open up your slideware and start creating on the computer. Start with your storyboard and write notes for what you want to say about each slide. (PowerPoint has the speaker notes area for this purpose.) Each slide should have one important point, and that one point should be made extremely clear by the slide. If no discernible point exists for the slide, delete it from your presentation.



DILBERT: © Scott Adams, dist. by United Feature Syndicate, Inc.

Do not put the obvious on your slide. An example would be to say that hail is an important forecasting problem at a severe storms conference. Instead, provide statistics, the number of events, the economic losses, or other facts that demonstrate to the audience why it is an important forecast problem.

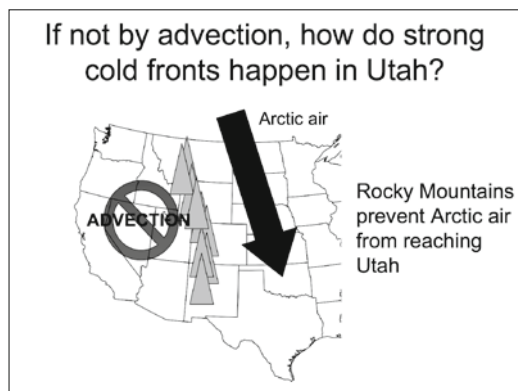
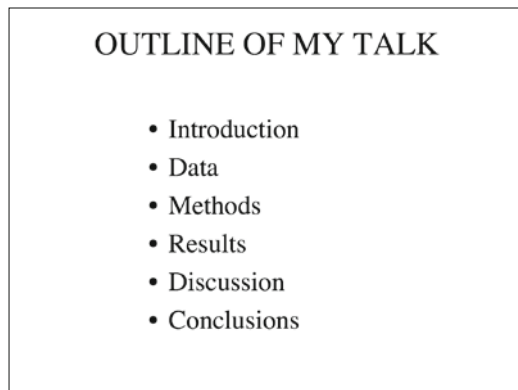
The rest of this section addresses the beginning and the ending of the talk, often the most difficult to construct and arguably the most important.

25.2.1 First few slides

Most presentations start with a title slide that presents the title of the talk, author, coauthors, and affiliations. This slide is usually on display while the speaker is introduced and while the speaker gives some introductory remarks. This slide can be quite creative or quite simple. Most often, it will not be on display for very long.

What comes next in many talks is the “Outline of my talk” slide. For a 10–15-minute conference presentation, the outline usually consists of some-

Fig. 25.1 (a) An outline slide in a talk about fronts in the Intermountain West of the United States. Such a slide is unnecessary. (b) In contrast, a strong motivating slide is a much better approach.



thing obvious to even a naïve audience member: an outline of how any scientific manuscript would be presented (Fig. 25.1a). Introducing your talk this way wastes time and loses the interest of the audience immediately. A better approach is to present the motivation, purpose, or goals of the presentation. Alternatively, following the title slide, present some shocking evidence that contradicts traditional thinking. By using the slide in Fig. 25.1b, the speaker wanted to motivate the question of how strong cold fronts occurred in Utah. By challenging the belief that such fronts might not be caused by the advection of Arctic air through the western United States, the speaker posed a question to get the audience thinking. Remember, with oral presentations, you have the ability *and the right* to be provocative.

Although literature reviews are effective in manuscripts, avoid presenting your literature synthesis in slide form. This admonition does not mean to omit all references, but putting previous work into context in the same way as you do in a manuscript is generally not needed. If your talk is going to resolve issues that have been debated in the literature, then painting the landscape of your presentation with a thoughtful, but focused, discussion of the previous literature is appropriate. Wherever possible, try to frame the debate around concepts rather than a recitation of “paper X did this, paper Y did that.”

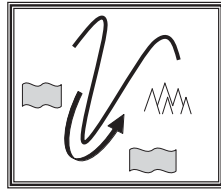
25.2.2 Last few slides

Your last slide should be *one* well-considered and briefly worded conclusion slide. Do not make extremely general statements that are obvious to anyone paying at least some attention during your talk (“The model was capable of reproducing the Madden–Julian Oscillation.”). Select real results that summarize your talk in a few key points, which should already have been done during the storyboarding.

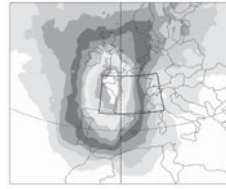
Although all slides should be simple, concise, and clear, the conclusion slide is especially important to emphasize the take-home message to the audience. A different style, but still quite an effective approach, to the conclusion slide is to present a conceptual model or graphical schematic. With Fig. 25.2, the speaker had tied all her results together with simple schematics or figures that were repeated from the talk.

Because the conclusion slide contains the summary of your presentation, leave it on display for as long as possible to allow the audience to fully absorb the message. Avoid presenting more after the conclusion slide, which will frustrate the audience who had hoped your talk was over. Do not close with a “Questions?” slide, “Thank you” slide, or the list of references from your talk. Moreover, be careful with “Future work” slides, unless you have some exciting prospects. Slides that include calls for more data or more case studies often do not value the audience’s time and are an anticlimatic way to close.

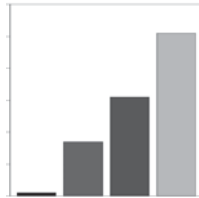
Summary



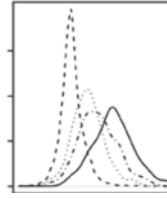
PV-streamer and heavy precipitation



confirmation of climatological link



seasonal variation of the link



importance of moisture flux

For more details see:
Martius et al. 2006
Int. J. Climatol.

Fig. 25.2 An effective schematic conclusion slide from “A climatological analysis of the link between breaking synoptic-scale Rossby waves and heavy precipitation events in the Alps.” (Figure courtesy of Olivia Martius.)

25.3 DESIGN ATTRACTIVE SLIDES

The general design, layout, and color scheme of slides alert the reader to the type of presentation you will give. The slides complement or may influence the audience’s opinion of the speaker. Well-constructed and attractive slides convey professionalism and credibility, whereas poorly designed or sloppy slides convey the opposite.

Maintaining a consistent look to your slides (e.g., background, font, color, transition between slides) indicates that the slides are part of a consistent message from the speaker to the audience. Too much variety becomes visually taxing to the audience. The advantage of maintaining a consistent look to the slides is apparent when the background or other style component is purposefully changed in the middle of the presentation. This dramatic change places a different emphasis on this material, allowing the speaker to indicate a change in direction to the talk.

Most organizations offer you a background slide to brand their image into the audience or as a watermark declaring the owner of the intellectual property. If gaudy, such backgrounds do a disservice to the presentation. Although small logos of your affiliation on the title and conclusion slides may be appropriate, such graphics on every slide are visually distracting. Another item of reducible clutter that often appears on each slide is the footer containing the speaker’s name and date of presentation.

Avoid standard backgrounds packaged with your presentation software—most are overused or poor quality. Sometimes individuals create their own backgrounds, but they may have the same disadvantages as the standard backgrounds. Some companies sell professionally designed backgrounds online; some of their simpler backgrounds may be useful. Avoid photos as backgrounds. If the photo is important, show it as a separate slide or as an insert, but remember to display the photo at the original aspect ratio, do not stretch the image to fit the available space.

All components of the presentation should be clearly visible from the back of the venue at which you will be speaking. One approach to assess the legibility of your slides is to run the slide show on your monitor and stand several meters away. Such tests can alert you to potential problems with your graphics. Use nonserif fonts (e.g., Helvetica or Arial), which are easier to read than serif fonts (e.g., Times).

Use light colors on simple dark backgrounds. Dark green, blue, or purple with white and yellow letters are an effective combination. Light-colored backgrounds, especially white, are not ideal for the following reasons:

- ▶ Red lasers (especially if the laser light is weak) may not show up well on white backgrounds.
- ▶ Slides with white backgrounds lose contrast if the room is not dark enough.
- ▶ Color to the slides is refreshing and not as tiring on viewers during long presentations.

Graphs, however, are generally more legible with dark colors on white backgrounds.

Do not use yellows, light greens, or light blues on a white background, no matter how good it looks on your computer. These colors simply do not show up when projected. Avoid contrasting color combinations: no red lettering on blue backgrounds.

When we see or hear a change, we expect it to mean something, so every visible or auditory change should convey information. This idea runs counter to the habits of many PowerPoint users, who include decorations or interesting (but essentially random) visual changes, thinking it makes the talk more attractive. But if words, shapes or effects don't convey information, they distract.
—Stephen Kosslyn (2007)

25.4 HEADLINES ARE BETTER THAN TITLES

The default in many slideware applications is to produce a centered title with a relatively large font (e.g., 44 point). Usually, these titles are too short to be meaningful or are entirely obvious from what the speaker is saying (e.g., Introduction, Data, Conclusions). Instead of a title, provide a headline in a slightly smaller font. Just as a headline of a newspaper article is a phrase or sentence that summarizes the article, a headline on a slide summarizes the slide or conveys the most important information. For example, rather than a slide called

“Results,” the headline might read “Zonal wind variations, not heating, cause Kelvin wave amplification.” Other points to consider about headlines:

- The headline forces you to define the main point of slide.
- A sentence headline orients the audience and speaker to the topic of the slide.
- Headline titles replace relatively nondescript titles, allowing more material to be removed from bullet points and reducing the number of words on the slide.

HOW TO CONNECT WITH YOUR AUDIENCE

After having determined who your audience is and what they want, what techniques can you use to connect with them? Think back to the last seminar you attended. What aspect do you first recall? Was it something shocking the presenter did? Was it an interesting story or fact? Was it a joke that the speaker told? These personal connections, what Alley (2003) calls “flavor,” can make the audience remember the talk.

Address the concerns of your audience. Forecasters generally want to know about techniques to improve forecasting, whereas researchers generally want to understand the science better. Therefore, if your topic is of interest to both audiences, have two versions available, depending on who your audience is. A third version may be needed when both are present. Talking to conference organizers or to people at the conference before your talk will give you some idea of your audience’s concerns, which you can work into your talk.

Provide some personal insight. Put your presentation in the context of your own story. What motivated you to look into this problem?

Tell stories. Knox and Croft (1997) elaborate on the importance of storytelling in the classroom, but the same is true for a presentation. A historical narrative about how the jet stream was discovered or the

societal impacts of a tornado outbreak help the audience remember the material better.

Use props. Dusan Zrnić, a radar engineer at the NOAA/National Severe Storms Laboratory, uses props in his seminars. To show an example of anomalous propagation of radar waves due to the refraction of the radar beam by a higher-density medium, he puts a meter-stick representing the radar beam into a beaker of water, showing the bending of the light rays. In another example, he uses a key ring, rope, and his body to illustrate the three-body scattering effect associated with hail (Fig. 25.3).



Fig. 25.3 Dusan Zrnić displays three-body scattering using a piece of rope (radar beam), two fingers (water-coated hail stones), a key ring (the ground), and his mouth (radar transmitter and receiver). (Photo by Jelena Andrić.)

- The audience can always read sentence headlines that they might not have heard.
- A sentence headline shows a perspective on a topic that a title phrase generally cannot.
- Headlines are useful if you lend your talk to others.

Because headlines are different from titles, they need to be properly placed on the slide so that audience reads the headline first. The sentence headline should begin in the upper-left corner of the slide, be 28–40-point font, be left

Use analogies, facts, or observations. Even we scientists can be so jaded by seeing the inevitable stretching of the vertical coordinate in cross sections that we need to be reminded that, if the earth were an apple, the thickness of the skin would be comparable to the thickness of the troposphere. Or, a radar can detect a single bee 10 km away from the radar. Not everyone may appreciate the Twomey (1974) effect, but nearly everyone can be engaged by observations of clouds from commercial airplanes. Furthermore, did you know that visibility can vary by as much as a factor of 10 for a given value of liquid-equivalent snowfall rate? Judicious use of metaphors also can be a powerful tool for engaging audiences.

Deliver a surprise. Gimmicks can make the audience remember your talk. At a conference, Prof. Peter Hobbs of the University of Washington played a narrated animated video that presented his group's conceptual model of extratropical cyclones in the central United States. At a Cyclone Workshop, John Nielsen-Gammon's presentation on potential vorticity concluded with him donning a hat bearing the words "PV Boys."

Ask the audience questions. Remember to talk *with* the audience not just *at* them. Engage the audience with questions. During a presentation on a climatology of drizzle in the United States and Canada, then University of Virginia student Addison Sears-Collins surveyed the audience about where they thought the most drizzly place was with the following

slide (Fig. 25.4). Questions also gauge the audience's knowledge of the topic. If you can be flexible, the answers to questions can be valuable for you to trim out material the audience already knows, or elaborate on topics the audience may not know well enough.

On the other hand, if you ask a question to the audience to gauge knowledge, be prepared for the worst possible answer. I was at a conference where the first thing the speaker did was to ask the audience, "How many people know about *knowledge management*?" When only one person in the audience raised her hand, the speaker said, "I have a problem." My immediate thought was, "I guess he didn't manage the knowledge well enough."

Challenge the audience. Audiences want to come to a talk and be inspired. Challenge them to new heights in your talk, then give them the knowledge or the skills they need to reach those heights.

What is the Most Active Place for Drizzle in North America?

- a) Hoquiam, Washington
- b) Cannon Beach, Oregon
- c) Norman, Oklahoma
- d) St. Paul Island, Alaska

Fig. 25.4 Survey the audience in your talk. (The answer to this question is St. Paul Island, Alaska, which receives 403 hours of drizzle a year [Sears-Collins et al. 2006].)

Table 25.1 Examples of headline titles for electronic presentations

Microwave precipitation algorithms underestimate rain rates in shallow convection.
Eddy energies scale with the mean available potential energy.
Our parameterization is not sensitive to the sea-salt flux from the ocean surface.
The daytime convective boundary layer decreases the wave drag.

justified rather than centered, be absolutely no longer than two lines, be colored differently than the rest of the text on the slide, and be written in active voice. Table 25.1 illustrates some examples of potential headlines.

25.5 DELETE UNNECESSARY WORDS

Most slides are cluttered by too many words. Some sources recommend no more than eight lines per slide, others no more than six lines per slide, yet some even recommend no more than six *words* per slide. I do not believe that a single recommendation can be uniformly applied to all situations. Instead, consider your audience and the purpose of the slide when deciding on its text content. For nontechnical audiences, favor fewer words than for more specialized audiences. Resist the temptation to place too many words on the slide as a crutch for yourself. Instead, remember what you want to say by using handwritten note cards or the speaker notes function in many slideware packages, or, best yet, through repeated rehearsals.

Some situations may be helped by putting more words on a slide, however. If you are speaking English in a foreign country, or you are speaking in a language that is not your native tongue, the audience will follow you more easily the more complete the phrases and sentences are on your slide.

The indiscriminate use of bullets on most slides should also be questioned. Could items that would otherwise be bulleted be simply indented or better yet eliminated? An even greater question is whether bullet points even adequately describe the relationship between the items. Bullets imply that all items are of equal value, which may not best represent the relationship between the points on your slide.

If you do use bulleted lists, keep them short, generally under four items, as the audience cannot remember much more. Long lists are useful to overwhelm the audience with strong evidence for your point. Leave empty space to prevent adjacent lines from blurring into each other. Aim to keep each bulleted item or headline on a single line, or at most on two lines. Make items in the list parallel (Section 9.4). Use well-constructed phrases rather than sentences, and skip nonessential punctuation. List items in a sensible order (e.g., chronologic, by importance).

USE HUMOR, ALBEIT CAREFULLY

Despite the oft-repeated adage to start your presentation with a joke, there may be good reasons to be more cautious:

- ▶ Although you want to show the audience you are comfortable and they are going to have a good time, some people's humor is too dry, sarcastic, or slapstick to appeal to everyone in the audience, and some cultures may be confused or offended by sarcasm.
- ▶ The beginning of a talk, when the audience is assessing the type of speaker you are, is a bad time to tell a joke. Additionally, you are not warmed up and may be slightly nervous, further ensuring a bad delivery.
- ▶ Some professional situations are not appropriate for any humor at all, especially racy or other off-color humor.

Instead of forcing humor, engage your natural humor. Humor gives an audience a needed mental

rest from your talk, which is why it is useful to work humor in later in the talk. Use humor, but sparingly and effectively, and only if it is relevant to your talk. Do not put entertainment over substance. Not only will the audience question your credibility, but even professional comedians know that the serious material in between the punchlines is necessary for the audience to appreciate the humor.

Visual humor usually goes over poorly, especially if a cartoon has multiple panels or lots of text. The time to delivery of the humor can take too long, and you are never sure when all the audience have read the text and gotten the joke so that you can move on. The silence and the sparse chuckling can be too uncomfortable. Single-frame comics without words and with an obvious joke provide immediate impact.

Humor works best in a packed room where laughter is contagious and sounds loud. In a huge auditorium populated by 30 people, even a hearty laugh has the potential to sound muted. If the audience fails to catch your first attempt at humor, better to avoid it through the rest of the talk. Not everyone is suited to make a crowd laugh.

Avoid gratuitous equations, as they slow down the pace of the talk and make your presentation more difficult to understand, even for mathematically oriented listeners. Presenting equations, especially derivations, usually requires too much time and demands too much patience of the audience. Present your ideas in words or graphics, wherever possible. When equations are definitely needed, define the variables and use annotations to explain the physical interpretation of the equation.

AVOID LONG STRINGS OF CAPITAL LETTERS. THEY ARE MORE DIFFICULT TO READ THAN LOWERCASE LETTERS, AND THEY TAKE UP MORE SPACE. Use left justify only, not both left and right justify; the unequal spacing that looks professional on the printed page makes reading short blocks of text on a slide more difficult. To create emphasis, words can be accentuated with color, italics, or upper case. Fonts should be 18-point font or larger.

25.6 INCLUDE RELEVANT AND CLEAR GRAPHICS

Some books on electronic presentations advocate that each slide should have one image or graphic. Because graphics are more visually stimulating than words, such graphics can amplify your point and potentially increase audience retention. As with most pieces of advice, it can be taken to the extreme. Do not embed a photo simply because it was a pretty picture or you felt that one was required. If you use photos, make sure that they relate to the content of the slides. A weak connection between the slide and the photo leaves the audience confused.

ASK THE EXPERTS

CREATING A MEMORABLE PRESENTATION

Svetlana Bachmann, Senior Research Engineer, Lockheed Martin Maritime Systems and Sensors

A professional electronic presentation can awaken even a lethargic audience, spark the curiosity of spectators, and open a surge of questions and suggestions. The following guidelines will help you achieve clear and entertaining presentations.

Try to avoid abbreviations, or provide a repetitive look-up option or legend. Often, I provide the meaning directly near the acronyms, using a smaller font. When such a direct approach clutters the slide, I create a placeholder (i.e., region for inserting text) for the descriptions (Fig. 25.5). Such a placeholder can be located in any portion of the slide, but should be clearly visible and readable. This placeholder can be left blank on the slides without acronyms or used for cartoons and notes.

Use color to draw attention. In my presentations, I sometimes use illumination. Suppose a slide has a white background and is partitioned in four sections. I place four gray-shaded rectangles with some degree of transparency over the sections, completely covering the slide. To draw attention, I remove one rectangle at a time—the white background makes the section pop

up, just like if it were illuminated with sunlight. Darkening portions of the slide to illuminate a particular section is also a powerful tool to draw attention.

Repeat important statements to highlight key points. Strategically placed statements can be used to keep your audience focused as you transition between slides. I often replicate the key item from a previous slide to create a smooth flow between the slides and to provide extra exposure for the key item.

Use amusing graphics or cartoons in your presentation. Humor can lighten the atmosphere, and the audience response tends to refocus any attention that may have drifted. Hint: exaggerate to engage viewers' imagination—for monetary advantage, show images of extreme luxury items; for an ingenious solution, show a maze with one obvious path out.

Include simple animations and graphics. Your visuals can suggest to your audience to be surprised, perplexed, satisfied, or unhappy. Hint: a cartoon scratching his head and shrugging his shoulders will indicate a difficult problem, whereas a cartoon jumping up and down and clapping his hands will signify a desired outcome.

Viewers who are exposed to a plot for the first time always need help understanding the meaning of this plot. You will definitely have to spend time explaining the axes, the shapes, and the meanings. An appropriate cartoon can save you the time and the

For graphs, the tendency is to use the same publication graphics you created for the manuscript. Sometimes, publication graphics do not make the best presentation graphics. What reads well on a journal page may not read well on a projector to an audience of 500. Take special care with axis titles, axis value labels, and other such items that may need to be enlarged to be readable.

Put as much descriptive (captionlike) material on the slide as possible. Doing so will prevent you from having to spend precious time during your presentation to explain the figure to the audience. Remember that the audience can read faster than you speak, and most in a scientific audience know

explanations. Once, when presenting a novel concept in clutter filtering for weather radar, I placed a plot of unfiltered Doppler spectra on one side of the slide and gathered cartoons of a radar, cloud, and building on the other side of the slide. I used colors to relate different portions in the plot with the appropriate cartoons. I replaced the unfiltered curve on the plot with the filtered one and used an animated bulldozer to

push the cartoon building off the picture. Obviously, we do not bulldoze buildings to detect weather, but the joke was understood and the plots did not need an explanation.

Although slideware has many tricks for creating animations, keep animations simple and few—too many visual effects might prevent viewers from focusing on your topic.

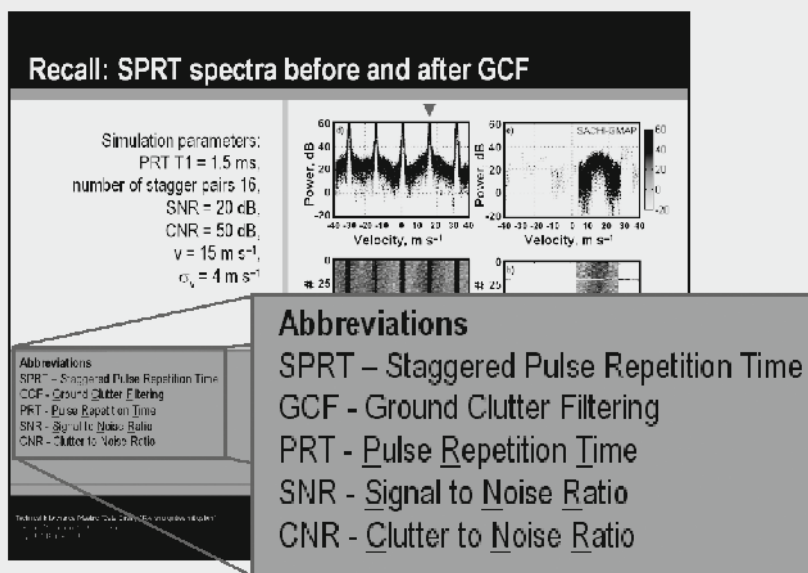


Fig. 25.5 A placeholder for abbreviations. (Courtesy of Svetlana Bachmann.)

how to interpret a graph if they know what they are looking at. In such cases where you are presenting an uncommon style of graphic, you may have to take some time to explain how to interpret the graph to the audience.

Annotated graphics also have the benefit of reminding the audience about details on the slides. The audience becomes momentarily distracted by the new visuals when slides change from one to the other and they may have missed hearing what the contours were. Or, your voice may not have carried well. Or they may have been daydreaming. Having that information handy in the title of the graph or in the margin allows them to continue to follow you.

Acknowledge the source of graphics you downloaded online, even if only a small acknowledgment in the bottom corner of the slide. Because of the prevalence of sharing graphics online, be careful to track down the original source and respect copyright. Digital images copied from Web sites (especially logos) might pixelate and look unprofessional if the graphic is stretched too much. Either use the image at the designated size or obtain a higher-resolution logo from the organization.

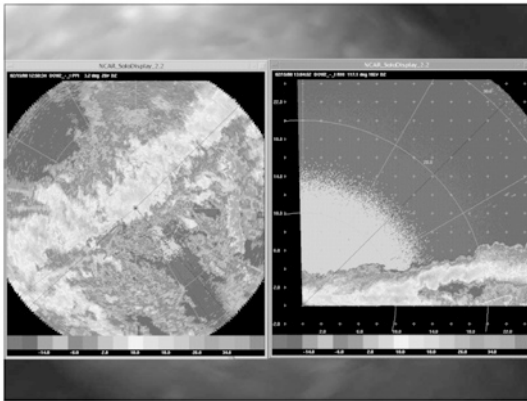
Should you use clip art or photos? Opinions vary about this. Slick stock photos with professional models may send the wrong message in a scientific presentation. Clip art is more generic, albeit less professional looking; photos of real scientists in real situations or photos of abstract concepts are generally more appropriate. Photos of real people help the audience relate to the topic on an emotional level. For example, which conveys more emotion: a map of the rainfall distribution for a flash flood in Missouri or a photo of a flood victim with her head in her hands?

Be creative when presenting your graphics. For example, to compare two graphs, rather than have them side by side, could you blend the two of them by fades back and forth? Make a boring flowchart more interesting by having photos or other graphics pop up as you describe the different elements. Embedded animations and movies can enhance a presentation and pique the audience's interest.

Finally, avoid clutter on the slides. Graphic designers recommend no more than seven items on a slide (e.g., headline, three bullet points, main graphic, two annotations). Less-cluttered slides have a more powerful impact, so use empty space to keep the items on the slide well placed.

25.7 EXAMPLES OF HOW TO IMPROVE SLIDES

To demonstrate some of the problems identified with poor-quality slides in this chapter and how they can be remedied, consider the following four draft slides, all in need of much improvement (Fig. 25.6).



(a)

Conclusions

- A strong cold front moved through northern Utah on 14–15 February 2000.
- Cold air arrived earlier aloft than at surface
- Pressure trough preceded front at surface
- DCAPE was large
- Precipitation varied with elevation
- Subcloud sublimation was important

(b)

Predictability

- Lilly (1972, 1990): From turbulence theory, and dimensional arguments:
 - Synoptic scales may have unlimited predictability
 - better initial state leads to better forecasts
 - Mesoscale may have limited predictability
 - better initial state yields little improvement
- BUT, Lilly (1990) predicted that cloud-scale models will provide more realistic simulations of cloud systems. (He was right!)
- Hence, the ultimate benefit of cloud-scale simulations may not be in forecasts of cloud-scale phenomenon. Rather, their main benefit may be in “removing damage due to inaccurate parameterizations”

(c)

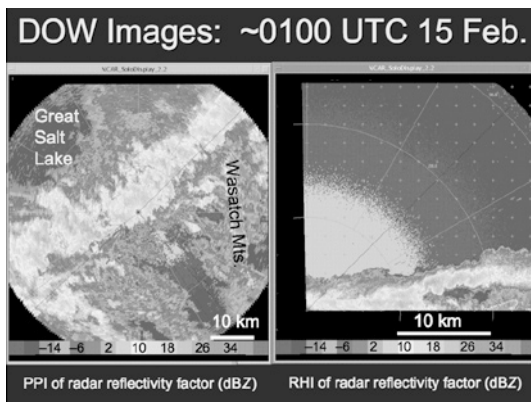
The Melting Effect as a Factor in Precipitation-Type Forecasting

- Kain et al. (2000): December 2000 *Weather and Forecasting*
- Earlier work by Findeisen (1940), Wexler et al. (1954), Lumb (1961), Stewart (1984), Bosart and Sanders (1991)
- Frozen precipitation falling through an above-freezing layer melts and absorbs latent heat from the environment.
- If enough cooling occurs, melting precipitation can be inhibited and rain will change to snow.

(d)

- a. The slide is obviously showing radar imagery, but we are not given any information about where or when this was. The scales are too small to read.
- b. These “conclusions” are not really conclusions at all, just a list of observations of the cold front. A busy background distracts from the text. Because the five bulleted points give the impression of equal weight, the most important conclusion of the research (“Subcloud sublimation was important”) is underemphasized.
- c. The slide is too wordy. The last highlighted line is actually too dark. The title of the slide doesn’t really say anything.
- d. As in (b), the busy background makes the text difficult to read. “2000” is repeated twice. The list of references seems unnecessary.

Fig. 25.6 Slides needing much improvement.

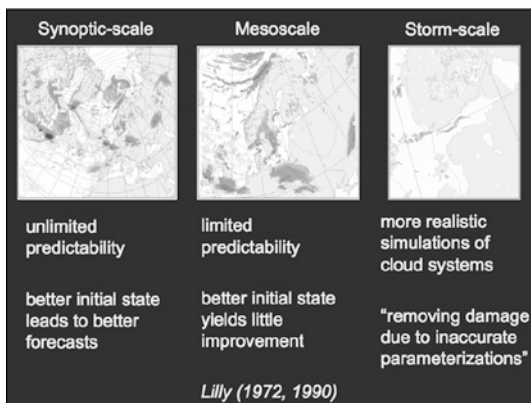


(a)

Subcloud sublimation creates nonclassical frontal structure.

- Cooling aloft first
- Prefrontal pressure trough
- Destabilization of prefrontal environment

(b)



(c)

Melting of snow can cool the air, changing rain to snow.

Kain et al. (2000, *Weather and Forecasting*)



(www.psp.state.pa.us)

(d)

Fig. 25.7 Much improved slides.

The problems with these slides are remedied in Fig. 25.7.

- Annotations now describe the graphs. Spatial scales and geographical annotation help identify the location. The small scales have been covered up, and new labels for the color-bar values have been created. The right image might be further cropped to highlight only the data, not the empty space.
- The title for this conclusion slide is a headline, and all the bulleted observations support that conclusion.
- Graphics and better organization to this slide provide a framework to see the differences in predictability described by Lilly.
- The physical process becomes the headline, followed by a photo illustrating the consequences of rain changing to snow. The citation remains to emphasize the article upon which the talk is based.

CONSTRUCTING CROSS-PLATFORM-COMPATIBLE PRESENTATIONS

Just because two computers have the same software does not necessarily mean that you will be able to load an electronic presentation from one to the other and expect complete compatibility. At least once during every conference, someone's mathematical symbols are replaced by icons of a phone, exit sign, or finger-pointing hand. Other changes that may occur during file portage include the sizes and types of fonts, arrangements and sizes of text boxes, custom animations, and links to external files (e.g., movies, sounds). Such problems are more common when transferring presentations between different platforms (e.g., Mac, Linux, Windows), but also can happen when transferring presentations between computers of the same platforms. Reasons for such incompatibilities include different versions of the operating systems, different versions of the software, and different preference settings.

The following tips can maximize the chances of your presentation being properly ported when the big time comes:

1. Deliver your presentation from your own laptop. Doing so will avoid nearly all problems. (Occasional incompatibility between the computer and the projector can occur, however.)
2. Choose standard fonts (e.g., Arial, Times New Roman, Symbol) as often as possible.
3. Leave some margins in the placeholders instead of pushing the text to the edge. Some font resizing may occur after transfer.
4. Directly embed graphics.
5. Put all linked content for the presentation (e.g., movies, sound files) into a single folder with the presentation, *then* create the link to the external files within the presentation software. Move that folder as a unit between computers.
6. Create equations as graphic items, then embed.
7. If transferring from a Mac to Windows, avoid using Mac PICT images, narration (which is recorded in AIFF format), or Quicktime files. Do not use slide templates for pictures as they convert the graphics internally to PICT format; insert your graphics manually instead.
8. If transferring from Windows to Mac, avoid embedded objects (Word and Excel files or graphics).
9. Movies work best on both platforms when in AVI or MPEG-1 format.
10. Instead of creating animation within a single slide (e.g., bullet points appear sequentially), create a series of slides differing only in the animation. The difficulty with this approach is that any changes to one slide in the series will need to be edited on all slides in the series, and placement of the items on the slide is important so that the items do not jump around during the transition.
11. Rather than incorporating an animated gif of radar imagery, place single images on a series of slides, and manually step through each slide.
12. Convert your presentation from slideware format to a more portable file format such as PDF.
13. Finally, and most importantly, test your transferred file thoroughly before your presentation.

25.8 USE EFFECTIVE TRANSITIONS

Revealing information piece by piece can keep the audience focused, especially when presenting the whole slide might give away the punchline. Slideware also allows for each bulleted item to appear sequentially. Unless you have carefully designed your slides and are using a remote-control clicker, I recommend not revealing bulleted items sequentially, for the following reasons:

LESSONS FROM THIS CHAPTER

- ▶ Plan your presentation through storyboarding.
- ▶ Each slide should make one point.
- ▶ Keep slides simple.
- ▶ Do not state the obvious.
- ▶ Keep the audience focused.
- ▶ Save the details for the question-and-answer period or the manuscript.
- ▶ Close with one well-considered conclusion slide.
- ▶ Headlines are better than titles.
- ▶ Remove unnecessary words from the slides.
- ▶ Are those bullets necessary?
- ▶ Find ways to connect with the audience.
- ▶ Use meaningful graphics.
- ▶ Graphics should be legible to the audience.
- ▶ Favor simple transitions.

- ▶ Clicking takes time, as most speakers will pause during the click.
- ▶ Lots of clicks means that you are tied to the computer if not using a remote control, inhibiting you from walking around during your talk.
- ▶ If you need to reverse direction to reshow a slide, you will need to wait for all your sequential items to play out in reverse.

On the other hand, complicated graphics can be presented much more effectively by building the graphic piece by piece. Use transitions to walk your audience through complicated slides using arrows, lines, pictures, and animations. Prof. Robert Fovell of the University of California Los Angeles says:

Complex graphics should build step by step. I present a conceptual model of a squall line like this. The first slide shows the cloud outline, used to explain the setting. Next adds precipitation. Next adds the cold pool. Next adds airflow arrows. Next adds convective cells, bright band, etc., until the model is complete. By this time, the model is busy but not inaccessible. It takes no more time than explaining a single very complex figure.

One of the most common devices that speakers use to add variety to their presentation is the transition between slides. Most transitions are too garish, slow, or inappropriate for most scientific presentations, so use a quick transition (“appear”), unless there is a specific reason for choosing a different transition (“dissolve,” “flash,” etc.). Do not set the transition on “random” unless you want your audience placing bets about what transition might appear next.

POTENT POSTER PRESENTATIONS

The other side of many scientific meetings are the poster sessions. In contrast to the relatively sedate monologues occurring at the podium, the poster sessions are boisterous and frenetic. How do you lure an audience amid the din and distractions? How do you communicate your results persuasively? This chapter addresses how to organize, assemble, present, and market your poster in a way to entice viewers, stimulate dialog, and enrich an active poster-session environment.

Poster sessions are a vital part of conferences and can be stimulating places to exchange scientific ideas. Sometimes viewed as the consolation prize for not getting an oral presentation, posters, if well constructed and well presented, can often be much more engaging and rewarding than oral presentations. I have heard the disappointment of colleagues who have spoken on what they thought was an exciting topic, only to receive middling interest or poor attendance from the audience, whereas a poster on the same topic would have congested the hallway with enthusiastic visitors.

With the pressure to make their meeting a success, conference committees sometimes select only the best or most well-known speakers to give oral presentations. Students and speakers not known to the committees may be less likely to receive talks. Thus, giving a good poster presentation by way of introducing yourself through your research to the conference committee members may be your way to more visibility at future meetings.

Corporate advertising that is simple, legible, and attention commanding sells. In the same way that consumers know Frosted Flakes because of Tony the Tiger, not because of the ingredients list or the nutritional information, the details of how your model was configured do not attract an audience—

the unexpected conclusion does. Imagine yourself walking through a poster session. Which posters will grab your attention and want to make you look? Certainly not the majority of ones that you see at a typical session, those that suffer from too much detail, too many words, and not enough *wow!*.

As discussed earlier, an oral presentation is necessarily condensed from a manuscript to meet time constraints. The difference between an oral presentation and a poster is an even greater commitment to focus. The best posters are characterized by a focused topic and a reduced amount of text and graphics relative to an oral presentation. This theme of focus and minimalism emerges repeatedly in this chapter.

27.1 TWO WAYS TO DESIGN A POSTER

There are two extremes of poster design. The first type of poster is the *self-discovery* poster (or less flatteringly, manuscript-on-the-wall poster). As the name implies, this poster contains the elements of a scientific manuscript: introduction, data, methods, . . . , conclusion. This poster is designed to be displayed without the presenter necessarily nearby. Usually such posters work best for conferences where the posters may hang for the few hours of the poster session, remain on display for most of the week, return home with the presenter, and then are put in the hallway at work. Without the presenter around, the poster needs to be largely self-explanatory with the viewers discovering the poster by themselves. Because large blocks of text do not attract anybody, results need to be explained in readable short-sentence or bullet form.

Figure 27.1 is an example of a well-constructed self-discovery poster. Below the title and the author list, a large box spans the poster and is boldly labeled “Introduction.” The text briefly explains what the McICA radiation scheme is, its advantages, and a possible disadvantage. The introduction also says that McICA was installed in the ECHAM5 climate model and, then, boldly and in larger font, asks the central question of the poster, “What have we learned?” Except for a box with two references at the bottom, the remaining five boxes each highlight one principal result of McICA from its three years of tests. Each of the boxes is headlined by the principal result, contains one relevant graphic for support, and is summarized by one or two bullet points.

Although this poster was designed for a specialist audience because of the content and some terms and acronyms being undefined (ECHAM5, ISCCP, beta distribution), even nonspecialists can appreciate the layout and the principal results because the authors used nonspecialist language for the most part. I might recommend the font size be a little larger, especially on the figures, to enhance the readability of the poster from more than a meter away. I would also stress to the authors to reduce further the number of words on

Tests of Monte Carlo Independent Column Approximation in ECHAM5

Petri Räisänen & Heikki Järvinen

Finnish Meteorological Institute

Introduction

The Monte Carlo Independent Column Approximation (McICA) for computing domain-average radiative fluxes in GCMs separates the description of unresolved cloud structure from the radiative transfer solver, by dividing the cloud field into a set of subcolumns. One or more randomly selected subcolumns are then used for each point in the spectral integration.

This allows a very flexible treatment of subgrid-scale cloud structure in radiation calculations. The results are **unbiased** with respect to the full Independent Column Approximation, but they contain conditional **random errors**. This "McICA noise" is the only potential disadvantage of McICA.

ECHAM5 provides an especially interesting testbed for McICA because it carries prognostic variables for the subgrid-scale probability distribution of total water content (Tompkins, JAS 2002). This allows us to derive subgrid-scale cloud variability directly from the resolved-scale model variables (Fig. 1).

After 3 years of tests of McICA in ECHAM5, what have we learned?

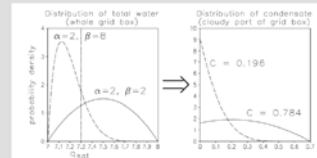
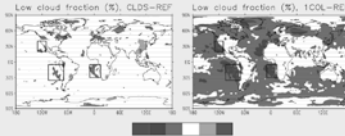


Figure 1. Cloud fraction C and PDF of condensate q_c are derived from the PDF of total water content q_t , subject to the assumption that the saturation specific humidity q_s is constant within the grid box. Those points with $q_c > q_s$ are cloudy and have condensate amount $q_c = q_s - q_t$. In this example, q_s varies between 7 and 8 g/kg, $q_t = 7.3$ g/kg, and α and β are shape parameters of the beta distribution.

1. The primary impact of McICA noise in ECHAM5 is a (very) slight reduction in low cloud fraction

Figure 2. Differences in low cloud fraction (percentage) between three versions of McICA in ECHAM5 simulations with prescribed sea-surface temperatures:

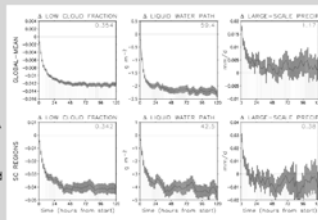


CLDS = a typical implementation of McICA
REF = a very low-noise reference version
1COL = a very high-noise implementation

2. The reduction in low cloudiness originates from a non-linear response of precipitation formation to random errors in radiative heating rates

- A very fast process: the biases related to McICA noise stabilize in a couple of days!

Figure 3. Impact of McICA noise on low cloud fraction, liquid water path, and large-scale precipitation rate for a very high-noise version of McICA (1COL), for a large ensemble of short (5-day) simulations. The upper row shows global mean values, and the lower row values for three regions dominated by marine stratocumulus clouds (marked with rectangles in Fig. 2). Mean values for the reference simulation are given in the upper-right corner of each panel.



3. When the sea-surface temperatures are allowed to adjust, McICA noise leads to a slightly warmer climate

- This is a straightforward response to the radiative perturbation related to reduced low cloudiness
- For a typical implementation of McICA, the impact is small (comparable to a 0.1 °m increase in cloud-droplet effective radius!)

=> In practice, McICA noise is a very minor issue for ECHAM5

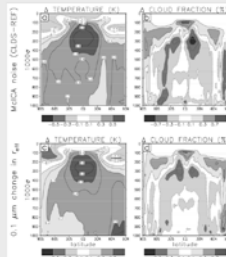


Figure 4. Impact on zonal-mean temperature and cloud fraction (a,b) due to McICA noise (for a typical implementation of McICA) and (c,d) due to a 0.1 °m increase in cloud-droplet effective radius, in ECHAM5 experiments with a mixed-layer ocean model.

4. Clouds derived from the beta distribution of total water content feature too little subgrid-scale variability?

- At least, this is true for the subgrid-scale variations of total column optical thickness

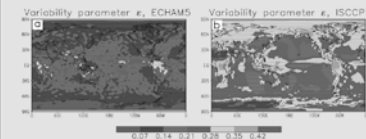


Figure 5. Cloud variability parameter γ for (a) ECHAM5 (resolution T42L31) and (b) ISCCP data. γ is a measure of variations in vertically integrated optical thickness within the cloudy part of the domain (e.g., a GCM column).

5. For ECHAM5, cloud fraction is too often 0 or 1

- This is not unique to the beta distribution scheme for total water content. The problem is worse when an alternative (relative humidity -based) cloud fraction scheme is used.

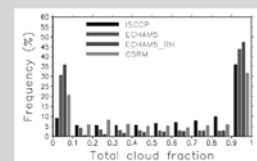


Figure 6. Frequency distribution of total cloud fraction for ISCCP data, ECHAM5, ECHAM5 with an RH-based cloud fraction scheme (ECHAM5_RH) and for global cloud-system resolving model data (CSR; Khairouddinov and Randall, Geophys. Res. Lett. 2001)

Interested in more details? Have a look at

Räisänen, P., S. Järvinen, H. Järvinen, M. Giorgetta, E. Roeckner, K. Jylhä and K. Ruosteenoja, 2007: Tests of Monte Carlo Independent Column Approximation in the ECHAM5 atmospheric GCM. *J. Climate*, **20**, 4995-5011.
Räisänen, P., S. Järvinen and H. Järvinen, 2008: Noise due to the Monte Carlo independent-column approximation: Short-term and long-term impacts in ECHAM5. *Quart. J. Roy. Meteor. Soc.*, **134**, 481-495.

POSTER DESIGN BY SYNOPSIS

Valliappa Lakshmanan, *Research Scientist, University of Oklahoma and NOAA/National Severe Storms Laboratory*

Making posters comes down to a philosophy of what posters are and who the target audience is. I use posters to provide only a broad overview of techniques and results. Most of the viewers of my posters are interested in the topic, but are not performing research on that topic. So, putting too much detail in posters is pointless. This approach to making posters is very different from the approach to writing a journal article, which is written for someone who may discover the article by searching the literature for keywords. Such a person is knowledgeable in the field, is more likely to be performing research on the same topic,

and is interested in the minute technical details of what we did.

The first step in creating a poster is to develop a one-minute synopsis of the research to be presented. Then, structure the poster as a whole to reflect this synopsis. Next, consider what you would say in a five-minute explanation of the research and make sure that the poster addresses those points without detracting from the one-minute explanation. Any detail beyond what you would explain in five minutes does not belong on the poster.

An example shows a poster describing our research on storm properties (Fig. 27.2). The one-minute explanation of this poster is that it describes the set of steps to extract storm-cell properties from radar imagery. Therefore, I designed the poster so that the main thing you see from a meter or two away are the arrows connecting the steps. The captions on the steps tell you what the steps are. The images themselves add the five-minute detail to the listing of the steps.

the poster. Other than those minor comments, this poster has a well-designed layout (the introduction box spans the whole top of the poster, boxes make it easy for the viewer to find the principal results) and accessible content (the introduction explains the purpose of the poster, the five principal results are in nonspecialist language).

The other type of poster is the *interactive poster* (Fig. 27.2). For such a poster to be successful, a presenter actively engages the visitors, interacts with them, and tailors the discussion to their interests. In the absence of the presenter, the viewer would get much less information from the poster. The organization of an interactive poster is much more flexible, using a minimum of words and lots of graphics. Interactive posters lure passersby to the poster with eye-catching graphics, a controversial statement, or stimulating conversation. Such posters can be the real highlight of a poster session, as large numbers of people are drawn to the debate.

Of course, posters of all kinds lie in between self-discovery and interactive posters. At the one extreme, a self-discovery poster allows the viewers to walk up, read it, and walk away, all the while the presenter standing there watching. At the other extreme, an interactive poster forces the presenter and the viewer to engage each other in conversation. Which is the better approach?



Automated Classification of Storms Based on Radar-Derived Storm Properties



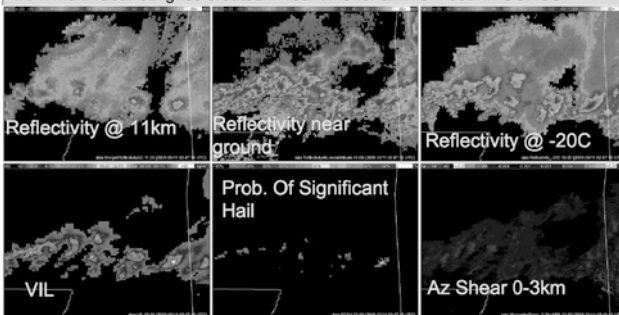
Valliappa Lakshmanan, Travis Smith, Robert Rabin
University of Oklahoma & National Severe Storms Laboratory, Norman OK, USA

Goal To identify the storm type (supercell, linear, pulse storm or non-organized) in real-time.

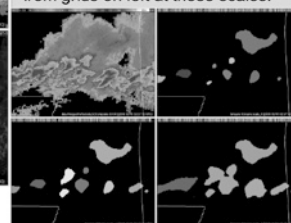
Why? 1. Automated classification can be used to create climatology of storms across CONUS
2. The climatology can be used to create guidance for probabilistic warnings.

Technique

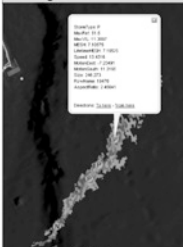
1. Some of the spatial grids input into the storm type algorithm: these are derived from multi-radar 3D grids created in real-time for all WSR-88D in CONUS



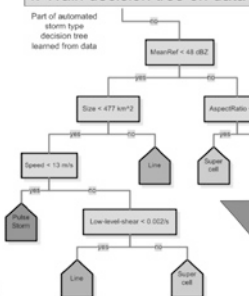
2. Pixels in the reflectivity composite field are clustered to find storms at different scales (20km², 160km², 480 km²). Properties are extracted from grids on left at these scales.



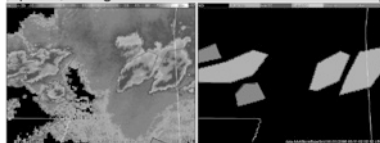
5. Storm type algorithm running in real-time. The results are shown visualized using Google Earth



4. Train decision tree on data



3. Human-training of storm-type algorithm, classifying storms into 4 types: supercell, line, pulse, unorganized



Future Plans

1. More categories of storms
2. A broader, more diverse training set
3. Build climatology in collaboration with NCDC

Can I try this on my data?

Yes, you can! Download the software from <http://www.wdssii.org/> and run w2segmotionll



Please do stop me if you see me in the hallway! I'd love to address any questions or comments.

Partial funding for this research was provided under NOAA-OU Cooperative Agreement #NA17RJ1227

Fig. 27.2 An interactive poster. (Courtesy of Valliappa Lakshmanan.)

Given the variety of posters that can be created, coming up with detailed rules for their construction is more difficult than for journal articles or oral presentations. Nevertheless, given the guidelines presented here, I encourage you to explore your creativity.

27.2 CONTENT AND LAYOUT

Whether you are designing a self-discovery or interactive poster, the basic principles are the same. As with writing and oral presentations, the purpose of the poster needs to be considered before construction even begins. The one-minute synopsis discussed by Valliappa Lakshmanan in his sidebar (page 308) is the hook that you need to focus the poster and the bait to get people to visit. Make the content provocative. Because of the large number of posters at a conference all being presented at the same time, your title should be short and attention commanding to stand out from the others. Highlight the stimulating material on the poster—use a background color that makes it stand out or place a giant question mark or exclamation mark next to it.

Visual allure is also an essential part of the bait. Because too much text turns away viewers, about 50% or more of the poster should be figures or photos. Perhaps a central image to the poster features a mysterious result demanding explanation, surrounded by other supporting observations. Or the poster focuses on the design of a new instrument, with data from its first field tests. Similarly, never crowd too much material on a poster—leave lots of empty space, otherwise the poster becomes too visually taxing for the audience.

Use a two- or three-column format, if necessary. The different sections should be made clear so that the reader knows how to navigate the poster and in what order. Should the audience read across or down? Use vertical or horizontal lines or boxes to partition your poster into sections, which are helpful to viewers trying to navigate your poster. For example, Petri Räisänen used numbers 1–5 in Fig. 27.1, and Valliappa Lakshmanan used arrows in Fig. 27.2.

The conclusions should be readily apparent, whether spread out over the poster (e.g., Fig. 27.1) or in a single box entitled “Conclusions.” When using a single box, most people pick the bottom right, although near the top is much more prominent because viewers do not have to bend over to see what is arguably the most important part of your poster. Use a differently colored box to highlight the conclusions, emphasize its location, and draw the audience directly to it.

Remember that minimal is better, especially for interactive posters (Table 27.1). First drafts of posters always tend to be too wordy. For that matter, so do second and third drafts. Draft out a poster, then cut and cut and cut. Use short,

Many of you feel an almost physical pain in deleting information from your poster. I know, I have felt it too. But what I have discovered, as have many others, is that it is possible to communicate almost as much in far fewer words and figures. —Warren Wiscombe, Atmospheric Radiation Measurement Chief Scientist, National Aeronautics and Space Administration

Table 27.1 Things to avoid on a poster

Photos or other detailed patterns as background
Long blocks of text
Small unreadable graphs
Complicated tables
Equations (unless sparingly and elegantly done)
Pixelated graphics (insufficient resolution)
Chartjunk (decoration, logos, unnecessary graphics)
References (include on a separate page or in the extended abstract)

uncomplicated phrases, bullet points, and graphics. As with slides, minimize chartjunk such as excessive logos, allowing the most important material to stand out. The next poster session you attend, look at the quality of the posters and ask what it was that attracted you or scared you away from the poster. Adopt similar principles in your own design.

27.3 PUTTING IT ON PAPER

As with the electronic presentations, readability of a poster is key. Use dark type on a light-colored background to prevent the ink from smearing and to make the poster more readable; the background does not have to be white, but light blue, yellow, or light green are all good choices. To create a strong contrast for a conclusions panel, for example, try a bold color scheme of white text on a dark blue background. Avoid having the poster all be one boring solid color. Background photos are too garish and often clash—or worse, merge—with the color of the fonts. When you use color, do so with purpose and for boldness. A bright color or different font can also be used effectively to highlight important points on the slide.

Choose large font sizes and large graphics. For the title and authors, use 72-point font and larger for readability from about 5 m, and the rest of the poster should use fonts 36-point and larger. Figures and text should be readable from about 1–2 m. For section titles and headings, use 54-point font or larger and different colors or fonts for emphasis. Larger font sizes also have the additional benefit of forcing poster authors to use fewer words. As with slides, sans serif fonts are more readable at large scales. Warren Wiscombe of NASA recommends using *Optima*, **Comic Sans**, or **Arial Rounded** fonts on posters, which look better than the *Arial* and *Helvetica* fonts at such large sizes.

Placing publication-quality graphics on a poster is rarely successful because the graphics were designed for close-up reading in a journal, not for

For my first poster presentation in 1997, I attached transparencies to the top of graphs to compare model results and measured data. This interactive element encouraged members of the audience to touch my poster and increased their interest in discussing my findings.
—Sabine Göke, University of Helsinki

long-range viewing on a poster. As such, figures will almost always need to be redone, enhanced, and annotated to make them more readable at the larger scale. Text will have to be enlarged to proper font sizes, and lines may have to be thickened to survive the enlargement.

Keep figures simple and self-explanatory. Avoid long captions, if possible. Use arrows and annotations to illustrate key points. A relevant photo can be an icebreaker to attract an audience to your poster. If you are presenting a modeling study of flash floods, a large photo or radar image of one of your cases is appropriate. Some people put their own photograph at the top of the poster so that others can identify the presenter during the conference. In addition, put your e-mail address and Web page on the poster.

Minimize equations on the poster, but, if they are absolutely essential, put them on a line by themselves and make sure to use a font size larger than the text font size, so that the equation stands out. Explain or define every symbol. You may also consider drawing circles around terms with a line leading to a text box explaining the physical significance of the term.

As the Spiros G. Geotis Prize winner for the best student presentation at the 1997 AMS Radar Conference, Sabine Göke of the University of Helsinki advocates giving the audience something to interact with: something to touch, windows to open revealing important results, an experiment to run, or games to play. Have props or an instrument on hand to show off. Run an animation on your laptop. Hand out prizes or small candies. Be creative!

Whatever graphical flourishes and gimmicks you use to attract people to the poster, remember that the ultimate goal is to communicate the research. Substance should trump style.

27.4 ASSEMBLING THE POSTER

Know the poster size before designing the poster. European posters tend to be vertical, whereas posters in the United States tend to be horizontal and a little larger. A bad outcome would be to design a large U.S.-style poster and get to the conference in Spain to find out that you have no space to hang it. If you are new to creating posters, find a design that you like as a starting point and ask permission from the author to borrow the style. Many posters are assembled in PowerPoint or Adobe software.

Before printing, look at the colors on a test poster (smaller size) because the printed colors may not look the same as on the screen. Thoroughly proofread the poster on the small paper, as well. Misspellings and typos are easier to spot on paper than on the screen.

There are primarily two ways to print the poster. The first way is to print on a large printer that uses large rolled paper. If your laboratory or university

does not have such a printer, commercial printing and photocopying companies have that capability.

The other way, albeit used less often, is to print the poster on individual sheets of letter- or ledger-sized paper and tack the sheets on the poster board at the conference. The advantage of this way is the ease of carrying the poster on the plane, rearranging it on the poster panel, and making revisions. The disadvantages are that multiple pages need to be hung and the optional hand-out is more complicated to create.

27.5 AT THE POSTER SESSION

Visit the poster area before the session to determine where your poster is going to be. Bring a few extra copies of the extended abstract, business cards, copies of any relevant manuscripts, and copies of your poster on letter- or ledger-sized paper. You may also want a bottle of water for yourself.

What is a poster session like? It is crowded, but lonely; invigorating, yet tiring; it is a great time to catch up with friends, but it is also a bad time to catch up with friends. Some poster sessions have hors d'oeuvres available and alcohol flowing to encourage participation and loosen inhibitions.

In this environment, I think more natural interactions occur with people interested in your research than during oral presentations. Unfortunately, because poster sessions require direct human contact, poster sessions can also be intimidating for both the person presenting and the poster viewer. As the presenter, your job is to market your poster. Be enthusiastic about your research. Do not be shy.

If I am alone and someone walks near my poster expressing a slight interest, I politely ask whether I could walk them through the poster. Most people appreciate this invitation. Alternatively, if you are a poster session attendee and walk up to someone else's poster, but do not get an invitation to be led through the poster, ask for one: "Would you explain your poster to me?"

Use Valliappa Lakshmanan's one-minute synopsis to lure people to your poster, particularly for people you do not know. If they appear hooked by the research, work in some material from the five-minute plan. Save the full five-minute plan for people you have fully engaged and for your colleagues who you know will want to hear it all. By gauging the knowledge and experience of your visitors, you may be able to skip some of the introduction or motivation and get right into the results. Remember that people do not always find what they are looking for in your poster, so do not be disappointed if you give your one-minute summary, then they nod politely and walk away.

When presenting, engage your audience and walk them through the poster, using the visuals as a map. Point to the poster frequently, but look at them in

When you present materials you must do it in a way that gives the impression that you think is it some of the most important information in the world. If you aren't convinced of that, why should others pay attention? Make believe you are an actor. The larger the group, the more you must ham it up and seem larger than life. —Cliff Mass, University of Washington

the eyes. Giving the same spiel about your poster repeatedly will be redundant and tiring for you, but remember that each new person is seeing your work for the first time. Try not to ignore someone because you do not know them—they might be someone who could offer you a job later. Try to engage everyone standing at your poster. Even if others come up and are listening in on your conversation, make them feel included. They may have some insight into the discussion and want to contribute. Speaking directly at them from time to time as the discussion progresses is your invitation to them that it is okay for them to contribute. Or, at a convenient time, stop briefly and introduce yourself, and find out more about their interests.

When they are done listening, thank the viewers for staying at your poster. Make sure that you catch their names, and exchange business cards if the exchange was fruitful.

If you find it difficult to attract people to your poster, you might do what Warren Wiscombe recommends: cruise the poster session, grab people, perhaps even by the arm, and lead them to your poster, giving them the one-minute synopsis along the way to entice them. Your (presumably willing) target will likely feel a bit special, knowing that someone left their poster to find him or her to show important science to. If you have brought back one the leaders in the field or your National Science Foundation program manager, others may be curious to see what the fuss surrounding your poster is about. As Warren says, “when you go fishing in the aisles, bring back a BIG fish.”

One downside of posters is that if you have a poster in a session, then likely there will be other posters on your topic also being presented at the same time. Because you want to be in front of your poster to receive questions, finding the time to look at others’ posters may be difficult. You can either take time off from your own poster or visit the poster room at some other time during the day, hoping that if you have any questions, you can find the poster owner later. Focus your efforts on those that have piqued your interest from the conference program.

27.6 A VISION

I am convinced that we can change poster sessions to make them the highlight of the conference. Conference organizers would then treat the presentations in the poster session with respect rather than as second-class citizens. Poster presenters would create their posters with a minimum of text and a maximum of creativity, and they would entertain and challenge the audience with interesting research. And, the audience would engage and debate the poster presenters, dragging their colleagues to an interesting poster, exclaiming “This is one you just *have* to see!”