

# Presenting Statistical Papers

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Improving the quality of presentations is an important goal of the American Statistical Association. This article summarizes information presented in workshops held at annual meetings to provide guidance for the presentation of statistical papers to general and technical audiences. Four key areas are emphasized in these workshops: (1) careful selection and organization of key themes and results to be presented; (b) construction and use of high-quality visual aids; (c) use of handouts for methodologic details; tables, graphs, and references; and (d) rehearsal, critique, and revision of oral delivery.

KEY WORDS: Effective communication; Oral delivery; Visual aids; Handouts.

The American Statistical Association has recently instituted several programs to improve the quality of oral presentations at its annual meetings. Since 1980, authors have been required to submit a complete draft manuscript by early June to retain their place on the program. The sections on Statistical Education, Survey Research Methods, and Physical and Engineering Sciences have conducted competitions for the best presentations in their sessions. All participants may, if they wish, receive feedback on their presentations.

Workshops on improving the quality of presentations were offered at the 1980, 1981, and 1982 annual meetings. Each workshop consisted of short talks on the components of an oral statistical presentation. Participants were encouraged to raise questions and to focus the discussion on their anticipated presentations. This discussion was carried out in an open meeting and in smaller groups.

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This article summarizes the material that emerged from those workshops. It is divided into four sections:

1. Selection and organization of material;
2. Preparation and use of visual aids (Table 1);
3. Guidelines for construction and use of handouts (Tables 2 and 3);
4. Oral delivery.

Careful attention to these topics should improve the quality of oral presentations, help statisticians communicate their work more effectively, and partially justify the effort and expense that goes into organizing and conducting statistical meetings at the national, regional, and local levels.

## 1. SELECTING AND ORGANIZING MATERIAL FOR PRESENTATION

Determine precisely what is to be communicated. This is the only guideline for selecting material. The requirement that a draft manuscript be submitted in early June forces the presenter to decide on the topic and issues, but this leaves considerable latitude in the specific content of the oral presentation. The choices involve identifying the central theme of the paper and the key supporting points. The time limit of 15 minutes for contributed papers means the theme must be direct and tightly focused. Invited presentations are longer, but concentration of material is still essential for effective communication.

The selected material should cover the following areas in a concise manner: the specification of the problem to be addressed, the approach taken, the results, and the implications. A brief historical sketch or an example can set the context for a precise statement of the problem. This helps communication because the speaker and listener are immediately focused on the same issue.

The statement of the problem usually points to a logical outline of the approach to be taken. Theoretical papers lend themselves to this structure quite nicely. Applications papers also include sketches of the study designs or analytical strategies employed.

When one presents results, principal findings should be carefully separated from supporting arguments in much the same way theorems are distinguished from lemmas. Detailed findings have to be omitted or be briefly summarized. The material should clearly support the central theme of the presentation.

The implications of the central theme should be addressed near the end of the presentation. This discussion should relate specifically to the perspective of the audience. Alternative approaches and ambiguities can be identified. Areas for further research can be

outlined. The concluding discussion should integrate the presentation for the audience.

The preceding paragraphs establish the organizational structure: Introduction, Main Body, Summary, which can be restated as follows:

1. First tell the audience what it will hear;
2. Next tell the audience your story;
3. Finally, tell the audience what it has heard.

The outline of the talk is further strengthened by effectively signposting the material. The simplest method is the repetition of key phrases. More subtly, concepts can be restated in different words to develop nuances and to elucidate the underlying meaning. Finally, it is critical that key sections of the presentation be concisely summarized. Signposting, in one of these forms, helps the audience follow the presentation. It also can reorient an audience member whose attention has wandered.

The next step is to prepare the talk using either notes or a complete script. The former is most common because preparation of a script requires substantial time and effort. Moreover, using a script may cause loss of the spontaneity that can be attained when one uses a combination of notes and visual aids or handouts

Notes can be either a detailed outline or a set of key points to be covered. In preparing notes one should remember that written and spoken language are quite different. Words and phrases statisticians and their colleagues rarely use when conversing should be avoided. Algebraic material should also be avoided because it is not feasible to communicate orally anything but the simplest equation. Finally, look for material that is more effectively presented in the form of visual aids or handouts.

## 2. VISUAL AIDS

Preparing notes will quickly suggest where visual aids will increase the effectiveness of the presentation. But again, selectivity is necessary since as a general guideline each aid will require about two minutes to present. The common forms of visual aids are 35 mm slides and overhead-projector transparencies. We limit our discussion to transparencies because they are easier to make and are more widely used.

Legibility is *the* key characteristic of any visual aid. The lettering on an 8½ × 11-inch transparency should be at least 11/32 inches high. This is based on the following rule of thumb: The height of the image filling the whole screen should not exceed 32 times the height of the lettering in a single line (H.E. Clark 1974). This assumes that no one is farther from the screen than six times its width. An 8½ × 11-inch page of ordinary type material is a disaster because such type is ⅛-inch high. One-quarter-inch type, such as an Orator type ball, is marginal at best. By the rule of thumb, ⅛-inch type would be appropriate if the original were no more than 4 inches high (e.g., a 3 × 5 card made into a slide).

The easiest method for making good visual aids is to print clearly, in dark letters, directly on transparent plastic laid over ruled paper with ⅜-inch lines. Some people may avoid this approach because it looks unprofessional, but such transparencies are often easier for the audience to read, and that is the only relevant criterion.

Legibility of the transparency is also affected by the amount of material presented. No one can look at a large table and make sense of it in a minute or two. One must give the message of the table in a few words or make a relatively uncluttered picture. Complex tables of data are often amenable to graphical presentation. A small table may be tolerable, if the discussion touches on nearly every entry.

A variety of combinations of marking pens and plastic transparency film seem to be satisfactory. Permanent pens do not smear or rub off, and they have other advantages (e.g., one can add a few marks in washable pen during the presentation and remove them later). Special erasers and alcohol permit corrections. Color can help to highlight the material but should be used with restraint. Transparencies with lettering or graphs in many colors often confuse the viewer and may be unfair to members of the audience who have color-vision deficiencies.

Even the most legible slides or transparencies will not work well if the meeting room is not properly set up to display them. The six-to-one rule of thumb stated earlier relates size of screen to size of room. For example, if a screen is five feet wide, every person in the audience should be within about 30 feet of the screen. Conversely, a room in which the last row of seats is 50 feet from the front should have a screen eight feet wide. Unfortunately, most meeting rooms are long and narrow with ceilings too low to accommodate a large screen. Rearranging the furniture and eliminating situations where the speaker must stand between the screen and part of the audience may help. When a table or part of the projector hides the bottom of the screen, the speaker should try to position the transparency so that the material being discussed always occupies the upper half of the screen.

When the projector aims up at the screen, the resulting keystone-shaped image may distort graphs and pictures. To cure this problem, good portable screens have a keystone eliminator, a metal bar at the top that tilts the screen to make the image rectangular again.

Room arrangements often do not include table space for the speaker who uses transparencies. The bare minimum space, *on the same table with the projector,* must accommodate an open file folder so that transparencies can be placed in a separate pile after use. Many speakers will also appreciate additional space for notes.

The presentation of transparencies is also a critical consideration (see also Mosteller 1980). A title transparency is often a good way to begin the presentation, particularly when the speaker has some introductory comments to make. It gives the title of the paper, the speaker's name and affiliation, and acknowledges any grants or contracts that supported the research.

A pointer, rather than one's finger, should be used to direct the audience's attention to specific parts of a transparency. The most effective pointers are transparent colored arrows. If a pencil is used, it should rest on the projector so that motion does not distract the audience.

Finally, it's also wise to glance at the screen occasionally, to ensure that all of the image is on the screen. Clearly, the transparency is of little value if most of it cannot be seen by the audience. The guidelines for constructing and using effective visual aids are summarized in Table 1.

*Table 1. Preparation and Use of 8½×11-Inch Overhead- Projector Transparencies*

- Use lettering at least 11/32 inches high
- Restrict transparency to less than 8–10 lines
- Use multiple colors with restraint
- Allow 2 minutes for each transparency
- Check equipment and meeting room beforehand
- Begin with a title transparency
- Use a pointer
- Move material to upper half of screen when discussed
- Do not remove transparency too quickly

## 3. HANDOUTS

The notes, on which a presentation will be based, may suggest that a handout will be required for effective communication. The handout can be either a complete manuscript or a presentation aid. Typically, it includes material that is too complex for effective oral presentation or visual aids.

If you decide to distribute the complete manuscript, you must still prepare an oral presentation, selecting and organizing the written material along the lines indicated in Section 1. It is inappropriate to read any handout word-for-word. The audience's attention will wander, as its members skim ahead or go back to recheck a point.

At what point in the talk should a manuscript be distributed? Clearly, if you will refer to a specific part of the complete paper during the presentation, then distribute the handout either at the beginning of the session or just prior to the talk. It may be preferable to announce the availability of the complete paper at the beginning or the end of the presentation. When sessions have been scheduled concurrently, distributing the handout at the beginning of the session will help those who cannot stay for the presentation.

For work in progress or when a manuscript is under revision, a presentation aid is more appropriate. It is important to remember that such a handout can be bothersome to an interested listener if it contains too many items or illegible or irrelevant material. Examples of presentation aids are summarized in Table 2.

If the complete written version of the paper is not available, an abstract and a list of references will be helpful. Including an outline of the oral presentation is another possibility that will help the audience follow the presentation.

*Table 2. Types of Material to Be Included in Handouts*

1. Abstract or outline of the talk
2. Summaries of results
3. Diagrams and flow charts
4. Definitions of special terms or acronyms
5. Lists of key points
6. Facsimilies or copies of special forms or questionnaires
7. Copies of transparencies or other visual aids

The handout might contain tables, graphs, charts, formulas, or equations from the complete paper. Special summaries of these items might be prepared to emphasize a few significant points. The aim is to convey information in an understandable form. The key is not to overburden the reader with distracting details.

Handouts can be very useful in conveying complex material in a simplified manner. For example, details of an elaborate computer program can be understood more easily in diagram form.

Often a presentation contains special terms and acronyms. Definitions of terms and acronyms, if brought together in one place, will help the audience and result in smoother delivery.

Often a speaker wishes to make a number of points related to a specific topic. He or she may give a rather lengthy discussion for each point. By the time point three comes up, the audience may have lost the context. A list of the items, briefly stated, can help keep attention focused.

It might be appropriate to include items such as a survey questionnaire or an income tax form, for example, when the presentation concerns data obtained from such a source. This is especially useful to a member of the audience when he or she is reconstructing your presentation at a later date.

Copies of the visual aids have a special appeal since they are not subject to equipment availability or failure. They are also helpful if some of the persons in the room are unable to see the visual aids. Finally, they can be taken home for review.

Of course, a speaker may choose to hand out other items or materials not mentioned here. In trying to decide how many items should be included, it is important to consider the time allotted for the speech. The use of a handout will take up time as the audience turns to the right page, a factor to bear in mind when one is considering whether to distribute a whole paper. Simpler handouts are the easiest to use, and only one or two key pages may be the most effective. The important thing is to select items that support the central theme.

To be effective, a handout should be typed, and it should have a cover sheet that provides the title of the paper or the presentation; the author's name, affiliation, address, and phone number; the name of the occasion for the presentation; and the date. Other possible features are page numbers (to be able to refer to a specific page), and numbers or letters on tables,

graphs, charts, formulas, or equations. This labeling is especially important if there are several charts per page.

A special feature that will help the audience follow the material more easily is highlighting, particularly if the handout includes tabular material. For example, when one is referring to a specific cell, row, column, or diagonal of a table, it helps if that item has been underlined, boxed in, or has asterisks next to it.

Finally, you should be sure to bring enough handouts to the meeting. The American Statistical Association guidelines suggest 50–75 copies for a regular contributed-paper session, 75–100 for a topic contributed-paper session, and 100 or more for an invited-paper session. Remember, it is better to overestimate than to leave some of the audience empty-handed and frustrated.

These points for the construction and use of handouts are summarized in Table 3.

## 4. ORAL DELIVERY

The final step is delivering the finished product. Often, despite a great deal of preparation, the presentation is a failure because the oral delivery is incomprehensible. The result is a frightened statistician stumbling along, boring and irritating the audience, for a seemingly interminable 15 minutes or longer. How can this be avoided? The only answer is PRACTICE. Every presenter is obligated to practice his or her talk at least once before confronting an audience.

Of the several forums for practice, the most obvious is in the privacy of one's home or office. Working in front of a mirror will help to identify any peculiar hand or body motions. This practice will also begin to set the timing of the talk. It is useful to put time checks in your notes so you can keep track during the actual presentation. Finally, this solitary rehearsal will help to identify difficult language problems. Some of this can be overcome through rephrasing material. Apparently insurmountable difficulties may be resolved through the use of visual aids and handouts.

Taping the presentation while delivering it to a small group of friendly critics will help crystallize the timing. It also will provide concrete evidence of peculiar speech habits. The critics will be able to point out parts of the presentation that are unnecessary or lack clarity. They can also critique your visual aids and handouts for legibility, simplicity, and effectiveness. It may be difficult to accept some of the criticism, but it is crucial to sharpening the presentation.

*Table 3. Construction and Use of Handouts*

- Include material too complex for oral or visual presentation
- Include title page, abstract, outline, and lists of references and footnotes
- Type or carefully hand-letter all material
- Consecutively number pages, figures, and equations
- Highlight critical information in tables
- Bring enough copies

A different approach to improving your style of delivery is listening to professional speakers such as news commentators and politicians. They earn their living through oral presentations, so they are continually demonstrating effective methods. Remember that they regularly rehearse their presentations. To appear unprepared would be disastrous. It is also worthwhile to observe the techniques used by statisticians known for their effective presentations. Reading a text on public speaking, such as Hodnett (1967), Kahn (1952), and Nizer (1940) can also help.

Before departing for the meeting consider your appearance. It may seem trite, but a reasonably dressed speaker is inherently more effective than one whose appearance distracts the audience. The statistical associations include professionals from academe, business, and government. Each group has its own dress standards, and these must be respected.

When you get to the meetings check on the room where the talk is to be delivered. This will give you time to familiarize yourself with room and audio-visual equipment and can help you avoid some nasty surprises. It is useful to get a friend to attend the session. Among other things, he or she will be able to assist in distributing handouts or to quiet noisy colleagues outside the room.

While you are waiting to speak you need to do two things simultaneously; the first is to review your notes and compose your thoughts. Each point should stand out clearly. Any key phrases should be mentally rehearsed. The second is to listen to the other speakers and watch the audience. This is not just a courtesy, it also may help your presentation. It is awkward, to say the least, when a speaker blithely details the proof of a theorem for which a preceding speaker has given a counterexample. Similarly, watching the audience can help you assess their collective mood. If they are leafing through the program, you can be sure they are not listening. This is a warning that you need to regain their attention.

The introduction of your paper can be a tense moment, even if you have carefully prepared and rehearsed. The usual advice is to swallow, take a deep breath, and speak out. A clear voice and a solid stance will command the attention of the audience. Use this attention to establish a calm friendly attitude with the audience and launch into your presentation. The critical "don't" is that you should never apologize for being a poor presenter. Nobody in the audience is interested in your limitations, especially when they may become self-evident.

Remain conscious of what is happening as the audience listens and watches you. This requires steady eye contact, with only occasional glances at your notes to be certain of key phrases and timing. Do not forget to check the screen to be sure your visual aids are placed properly. While you are speaking, maintain an even breathing pattern much as you would in ordinary speech. This is a habit acquired through practice. If your throat feels strained or dry, you may be speaking

from your throat. Slow down and catch your breath.

Your voice should be modulated across its whole range. Using varied levels can enhance audience attention. Similarly, vary the rate of speaking so that major points receive appropriate emphasis. Key phrases, signposts, and summaries should be delivered at a slower rate than the detailed results. No one speed or pitch is optimum for the whole speech. Both varied rates and modulation must be used to maintain the interest of the audience. The central criterion is to project your enthusiasm for the presentation.

At the end of your presentation summarize concisely and sit down. "A speaker who does not strike oil in ten minutes should stop boring" (Nizer 1940, p. 40).

After the presentation there may be time for questions. Listen attentively and remain cordial even when the question seems hostile. It may well be that the questioner is merely nervous. Repeat the question to be sure you understand it and that the audience has heard it. This also gives you time to develop an appropriate response. Then answer it briefly and directly. Evasive and long-winded answers only serve to confuse and irritate the audience.

Finally, when the session is over, seek out your friend and obtain a critique. By listening to his or her comments you will obtain a clearer idea of what the audience heard. If you can act on your friend's critique in your next presentation, it should be even better.

## 5. CONCLUSION

ASA's emphasis on effective presentations has highlighted the need for statisticians to effectively communicate the results of their work to each other, to other scientists and engineers, and to society in general. In discussing the key components of an effective oral presentation we have pointed out the importance of careful selection and organization of the key themes and results to be reported, the need for legible visual aids, the preparation of handout material to provide further detail and references, and finally, the rehearsal, critique, and revision of your delivery prior to the intended presentation.

The result of these efforts will be an informative presentation that will be understood and appreciated by your audience and will reflect favorably on you and the organization you represent. Emphasis on good communication is infectious and will permeate all of your communications (teaching, consulting, writing, etc.) and spread to many of your colleagues. The long-term result will be a more rapid advance for the profession, which will be beneficial to all.

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