

EFCATS

European Federation of Catalysis Societies

How to give successful oral and poster presentations

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See also:

[http:// www.efcats.org](http://www.efcats.org)

How to give a successful oral presentation

develop your own presentation style...

... but try to avoid commonly made mistakes

Introduction

How often have you been listening to oral presentations that dealt with interesting science while you nevertheless had difficulty to pay attention till the end? How often did you lose your interest before the speaker had even come halfway? Was it because of the subject of the talk or was it the way the speaker presented it?

Many presentations concern interesting work, but are nevertheless difficult to follow because the speaker unknowingly makes a number of presentation errors. By far the largest mistake is that a speaker does not realize how an audience listens. If you are well aware of what errors you should avoid, the chances are high that you will be able to greatly improve the effectiveness of your presentations.

The Attention Curve

The average attendee of a conference is by all means willing to listen to you, but he is also easily distracted. You should realize that only a minor part of the people have come specifically to listen to **your** talk. The rest is there for a variety of reasons, to wait for the next speaker, or to get a general impression of the field, or whatever.

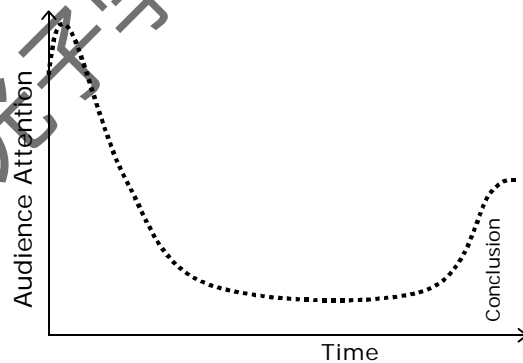


Figure 1 illustrates how the average audience pays attention during a typical presentation of, let's say, 30 minutes. Almost everyone listens in the beginning, but halfway the attention may well have dropped to around 10-20% of what it was at the start. At the end, many people start to listen again, particularly if you announce your conclusions, because they hope to take something away from the presentation.

Figure 1 Typical attention the audience pays to an average presentation

What can you do to catch the audience's attention for the whole duration of your talk? The attention curve immediately gives a few recipes:

- Almost everyone listens in the beginning. This is **THE** moment to make clear that you will present work that the audience cannot afford to miss.
- If you want to get your message through, you should state it loud and clear in the beginning, and repeat it at the end.
- The best approach, however, is to divide your presentation in several parts, each ended by an intermediate conclusion, see Figure 2. People in the audience who got distracted can always easily catch up with you, particularly if you outline the structure of your talk in the beginning.

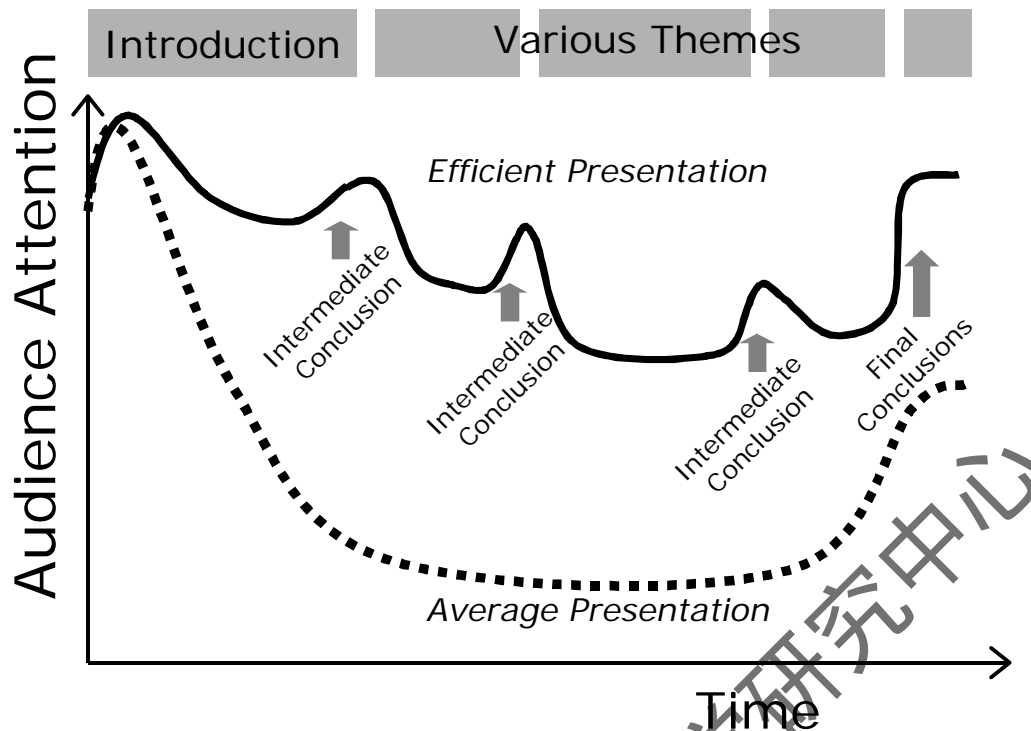


Figure 2 Ideal attention curve of an audience when the speaker divides his talk in recognizable parts, each summarized by intermediate conclusions. If people lose their attention for some reason, they can easily catch up with the speaker in one of his intermediate summaries. The big advantage of this approach is that every important item is said several times. Repeating the essentials is the key to getting your message across

Why does an audience get distracted?

There are many reasons why this may happen, some may be outside your control, such as inadequate sound systems, poor overhead projectors, or noisy conference centers with cardboard walls between two sessions running in parallel. What you can do, is avoid anything that may encourage the audience to stop listening. Such mistakes fall in two classes: speaker's errors and presentation errors. We list a couple of the most common ones, most are self explanatory.

- 1) The speaker lives in his own little world of research, he believes that all the background information needed to appreciate the meaning of his work is common knowledge. This is seldom the case!
- 2) The structure of the presentation is unclear, and consequently the line of reasoning is hard to follow. Important matters as problem identification, aims, or motivation are insufficiently clear.

AUDIENCES LOVE BACKGROUND INFORMATION!

You can raise the interest of attendees who are not per definition interested in your subject, by giving them the impression that they will learn something from your talk. Note that this part of the audience is more interested in general aspects than in the details. You certainly need to give them a good introduction into the background of your subject, before they can fully appreciate the subtleties of your work. Hence, you should spend at least some 30% of your time on general themes, e.g. what is known about the catalytic reaction and the catalysts and how it is applied in industry, or perhaps a less known method of research that is more generally applicable, etc. A large part of the audience may find this very useful to know. But what is even more important, with sufficient background information they will understand a lot more about your specific results, i.e. that part of the talk you are most proud of.

- 3) Visual aids (transparencies, slides) are inadequate, confusing, unreadable, too small, too crowded, etc. Some speakers show too many in a too short time (one per minute is not bad as a rule of thumb).
- 4) The speaker uses long, complicated sentences; he uses unnecessary jargon, abbreviations or difficult words. Passive sentences (“*From this figure it was deduced that ...*” or “*It was therefore concluded that*”) are more difficult to follow than active ones (“*This figure implies that ...*” or “*Therefore, we conclude that ...*”).
- 5) Even worse is when the speaker reads his speech from paper and forgets that
 - a) written language is usually more formal and complicated than language used in everyday conversations, and
 - b) reading written text goes a lot faster than impromptu speaking.

In such cases the audience will definitely experience information overload. Of course we sympathize with the speaker who feels insufficiently confident in English. However, reading a text is almost always an unsatisfactory solution. And after all, nobody in the audience will blame you for a couple of mistakes in the language, English will be a foreign language for the majority of the participants.
- 6) Monotonous sentences, spoken either too fast or too slowly, lack of emphasis, unclear pronunciation, all make it difficult for the listeners to stay attentive. Some speakers turn their back to the audience and watch the projection screen while they are talking, instead of trying to make visual contact with the audience.

Not too fast, please....!

Many speakers have rehearsed their talk so often that they speak too fast. Others simply have so much to cover, that the only way to stay within the allotted time is to speed up. Of course, this is not in the interest of the audience, particularly not at an international meeting.

... and try to vary your pace

As a rule of thumb, speaking at 150 words per minute is all right. However, try to vary your rate. Key ideas, complicated points, or concluding remarks (you may want to use one at the end of every slide you show) are best presented at a slower pace.

How to organize your presentation

You should be aware of fundamental differences between an oral presentation and a written report. In the presentation the listener by necessity has to follow the order in which the speaker presents his material. The reader of an article can skip parts, go back to the materials section, take a preview at the conclusions when he reads the results, etc. Exactly because of this reason, all scientific reports follow the generally adopted structure of *Abstract – Introduction – Experimental Methods – Results – Discussion – Conclusions – References*. However, this structure is totally UNSUITABLE for an oral presentation. Nevertheless, the majority of contributed talks at a conference adheres to it.

Why is this generally accepted structure unsuitable for lectures? Because the listener will have to remember details about the experimental methods until the results are presented, and he must recall the various results when the speaker deals with the discussion. In other words, details that should be combined (the why, how, what and what does it mean of a particular experiment) are treated separately. You ask a lot from the audience if they need to remember all these facts and figures until at the end you explain how these bits and pieces fit in a larger picture.

Grouping together what belongs together is a much better way to organize your talk. Hence, if you discuss characterization by e.g. XPS, you start this part of the presentation with a few introductory remarks of what you want to learn about your catalyst, how XPS may help you

to provide this information, then you show a few results and you discuss what they mean. End with a conclusion. Then you go to the next item in your presentation, which may be determination of particle size by TEM. When finished with this, you may give an overall conclusion on the state of your catalyst before you go on to speak about catalytic behavior.

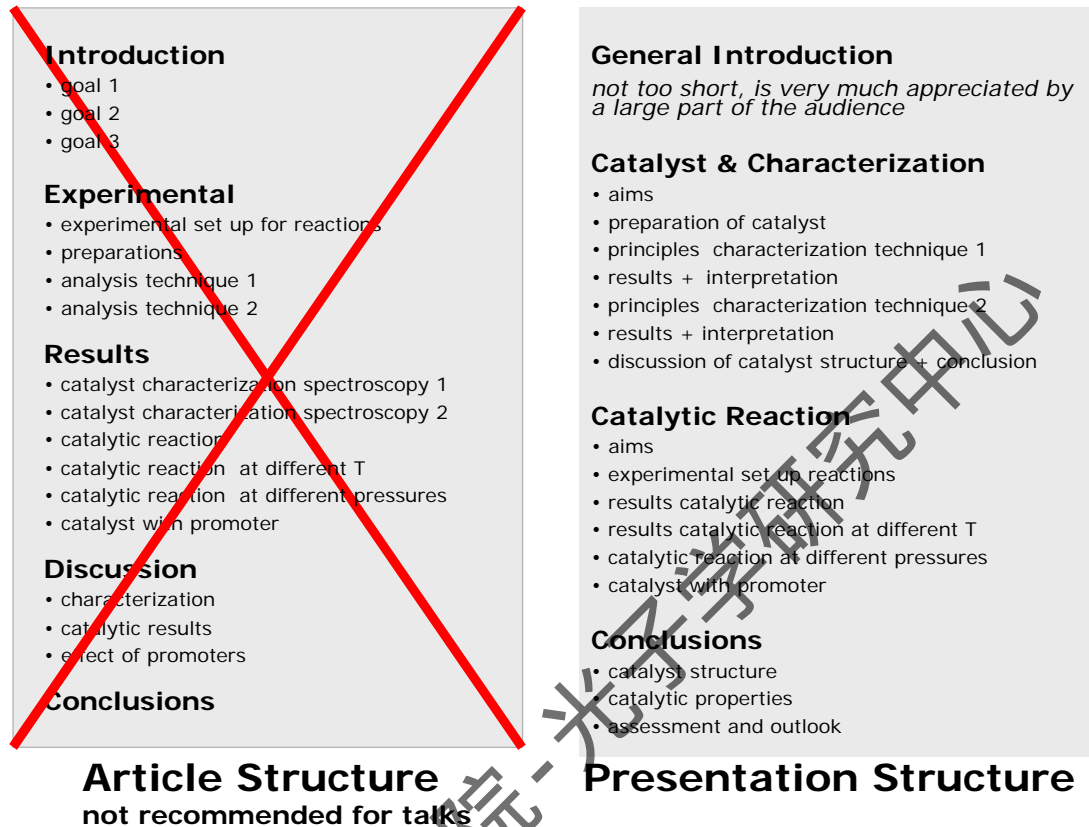


Figure 3 In an oral presentation you should group together what belongs together.

In Ten Steps To a Successful Presentation

You should realize that the two key issues in the preparation of a talk are:

- The message: What do I want the audience to know when I am finished?
- The audience: How do I present my talk such that the audience will understand and remember what I have to say?

1) Start in time.

Once you submitted the abstract to the conference organizers, it is time to start thinking about how you organize the material in a talk if your abstract will have been accepted. Read about the background of your work, read related work, look at your own results regularly and think about the most relevant conclusions. Try to imagine what type of audience you would have and consider what you would have to include as background information

2) The Message

Try to capture the message of your presentation in a single sentence. This is difficult. You will only be able to do this if you really master your subject (which is actually the main requirement for being able to clearly present your work to others).

Example:

"I want to convince the audience that among a class of bimetallic catalysts the combination of Fe-Ir/SiO₂ shows the best catalytic performance for CO hydrogenation and that it works because the adsorption energy of carbon monoxide is efficiently diminished with respect to that on the single metals."

3) Select Results and Order Them

Use the sentence under 2) as the criterion to select which results to include, in what order, what basic information is needed to appreciate these results, and which experimental details are necessary and which not. Be very critical, any experiment or result that does not contribute to your main message should be left out.

Although it may at first sight seem natural to present your results in the chronological order in which you obtained them, this does not have to be the most ideal order for the audience to understand what you have done. Think about where to discuss highlights, at the beginning? Near the end? Maybe dispersing the remarkable features through the entire talk? It is up to you, but take the order which you feel appeals most to the audience.

The scientific background of your audience determines how much you should explain about experimental approaches, characterization techniques. Be careful NOT to identify your audience with your supervisor, the majority of listeners is unlikely to possess much specific knowledge about your subject. By the way, hardly anyone minds to hear something he already knows, as long as you explain it well, and possibly in an entertaining way.

4) Opening and Introduction

In the opening, i.e. the first few sentences, you catch the attention, for example by a scientific question, or a catchy or maybe even provocative statement. Perhaps you could already give the conclusion of your work too. Try to speak slowly, with emphasis, and look at the audience. Of course, you must have prepared and rehearsed the opening carefully.

However, before you give your opening sentence, it is good to start with "Mister Chairman, Ladies and Gentlemen ... " followed by a few seconds of silence, in which you look around to see if people are paying attention. By doing so, you actually force the audience to listen. With these words you also test the sound system, and you ascertain that your important opening lines are going to be heard.

DON'T DO THIS

An often heard, but poor start of a presentation is:

"Good morning, ladies and gentlemen. I am ... and I'd like to tell you something about my Ph.D. project at the Group of Archaic Chemistry at the University of Science City. The title of my talk is I will start with an Introduction, then explain the experimental techniques, next present the most important results, and finally I hope to draw a few conclusions and I want to acknowledge a few people. So let us start with the Introduction ..."

If you open this way you will find yourself in the company of many others. Nevertheless, this is a totally inefficient way to start a lecture. How would you respond if you were in the audience?

In the rest of the Introduction, you sketch the background of your research. Remember that many people will be very interested in a concise summary of the status in your area. Hence, reserve sufficient time (i.e. at least 30% of the total time) for the general aspects of your work. It is good practice to not only clearly identify the scientific question you address, but also give the conclusion of your work, if you wish so. In this way you enable the audience to better follow your reasoning and to anticipate on the outcome of the experiments. In other words, you give them a chance to listen actively. Remember that a scientific presentation is not a detective story which is solved in the last moment.

5) Conclusions and Ending

Conclusions should be properly announced to regain full attention. Present your conclusions in relation to the questions you raised in the Introduction. Avoid all irrelevant details. Once you finished the conclusions, you may acknowledge people who helped you (not the coauthors listed in the program) and the Funding Agencies. Then you may end with a final sentence that repeats the message of your talk, for instance: *“Ladies and Gentlemen, I hope I have convinced you that XYSupport is a very promising catalyst for converting methane into synthetic gasoline at room temperature.”* This is the take-home message that the audience should remember, hopefully in combination with your name and affiliation.

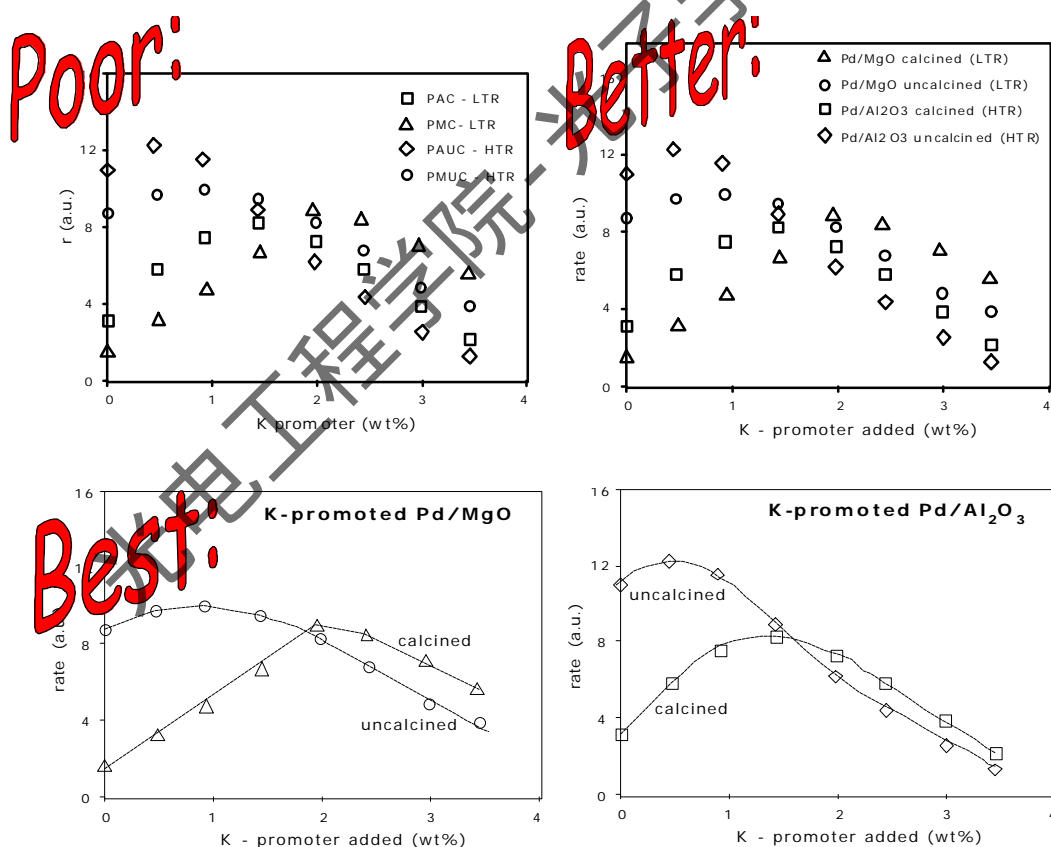


Figure 4 Spreadsheets often produce unsatisfactory figures, particularly with respect to labeling. A good figure has labels on the curves and not in a legend. Secret codes and jargon should be avoided as much as possible

6) Excellent figures have the highest impact

A picture is worth a thousand words. Well, not necessarily. Figures, especially those generated by spreadsheets, may look neat and tidy but at the same time they may be real puzzles (see Figure 4). A good picture to be used in an oral presentation

- is easy to read (large lettering, good contrast),
- explains itself (clear title, preferably a conclusion too)
- contains only relevant information,
- does not contain jargon or difficult codes that the audience needs to translate.

Hence, when showing a series of spectra or activity curves, you put an understandable label on each curve (not a,b,c, which are explained in a separate legend!!). Avoid reference to samples in codes such as “Sample AX234/a5” which may be handy in laboratory notebooks, but are unsuitable in presentations (and in articles as well).

Using **tables** with numbers is in most cases not recommended. Remember that an audience reads everything you show on a transparency, and while they read they pay less attention to what you say. Also avoid theoretical formulas and mathematical derivations. Sometimes you may have to show one, but try to keep it to a minimum. You should realize that the human memory remembers in terms of pictorial information. Hence clear figures, schemes, and diagrams are the best means to convey information.

7) Visual Aids: Overhead Transparencies, Slides, or Computer Projection?

Using transparencies on a simple overhead projector is more or less problem free. In most cases, transparencies project well, are easy to read for the audience, and the lecture hall does not have to be darkened so that people can make notes if they wish. For you as a speaker, transparencies leave you the flexibility to make last minute changes, or even write on them during projection.

Slides do not give this kind of flexibility. Optimally prepared slides in combination with a high quality projector can certainly provide beautiful visual support to your talk. Unfortunately, many slide projectors offer less than optimum quality, and moreover, many speakers show unsatisfactory slides. In addition, many things may go wrong: slide carousels may get stuck, slides may go upside down, the slide control does not work properly, etc. Another serious drawback of using slides is that the lecture theater has to be dark, making it difficult for the audience to take notes. If the speaker is insufficiently entertaining, one easily falls asleep...

Recently the use of computer projection with a beamer has become popular. No doubt, this offers wonderful opportunities for spectacular effects. However, most portable beamers are not bright enough for large conference halls, and only very few

Tips for effective transparencies

- Preferably use landscape format
- Use large lettering
- Black letters on a white background, or bright yellow on black or dark blue give the best result
- Do not use structured backgrounds and do not waste too useful space on logos, etc.
- Use pictures, figures, with a title, a short, clear caption
- Avoid data in tables or in text
- If you use text than no more than 8-12 lines per slide
- Avoid complete sentences, use “headlines”
- Give each slide a title and try to include a brief conclusion at the bottom of each slide

Remove all information from figures that is not absolutely necessary, but do provide clear understandable labels on curves and spectra, so that they become self explanatory to the audience.

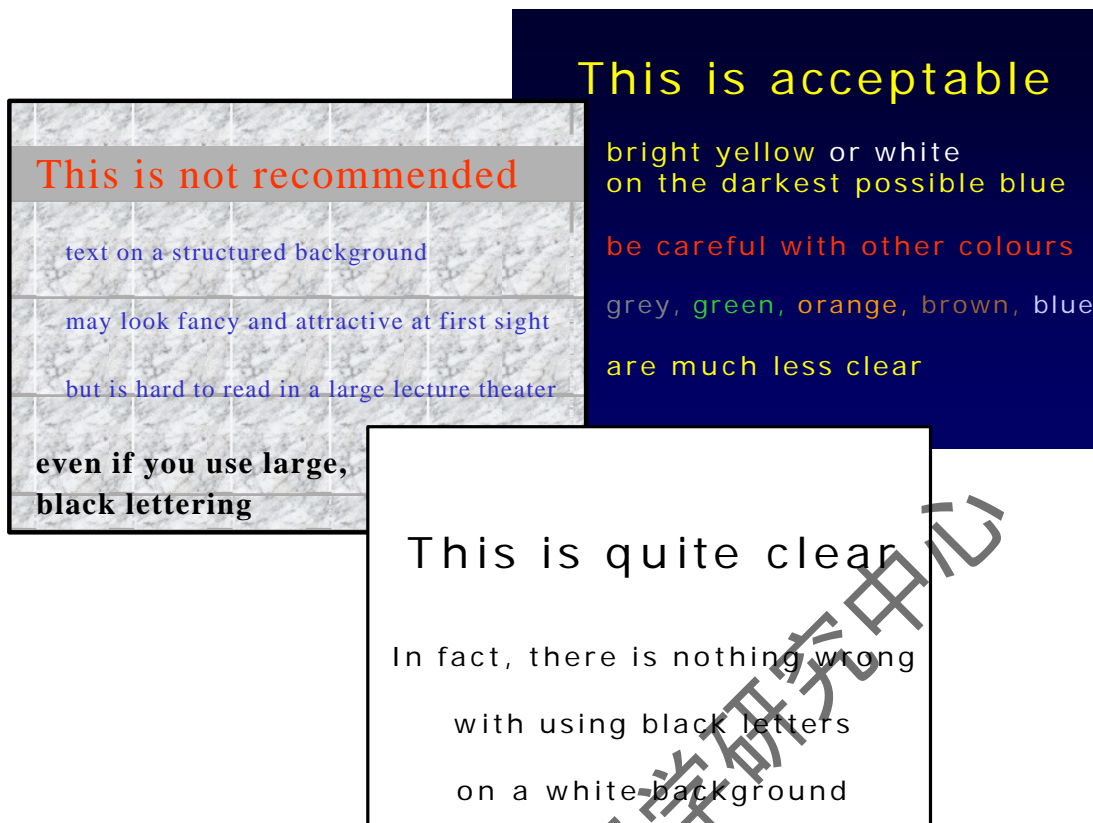


Figure 5 Be careful with colors and backgrounds on overhead sheets, slides and posters.

conference centers have the necessary high-quality beamers installed. Also, the usual presentation software offers so many inviting opportunities, that speakers often use ineffective color combinations and disturbing background patterns, see also Figure 5. Actually, the ‘old fashioned’ overhead slides are not so bad at all...

8) **Communication in stead of performing**

Your presentation will be most effective if you use the same everyday language in which you explain things to a fellow student in the lab. There is absolutely no need to use a more formal language. In fact, formal language is not desirable at all as it is more difficult to understand for the audience. Do not try to impress the audience with fancy words, formal constructions, subject-specific jargon, or unnecessary abbreviations. Think about oral presentations in terms of communication and do not see it as the performance of a literary play. The audience will be grateful if you are easy to follow.

9) **Timing: Absolutely Necessary**

Now comes the moment of truth: Does everything you prepared fit within the available time? There is only one way to find out: Take your stopwatch and go. This is usually a frustrating experience. First, you may note that the sentences simply do not come. My solution is to sit down and write the first part out in clear, short sentences. Second, you will probably find that you have too much material. Hence, you have to cut down and I do hope that you will not take out too much of the General Introduction. With the attention curves of Figures 1 and 2 in mind, it is probably the best to skip a few less important items in the middle of your talk. You should never compromise on the Introduction and the Conclusions!

Carefully timing your presentation is extremely important. Going overtime is an offense to the audience and to the speakers following you, particularly if there are parallel sessions. Nothing is more embarrassing than that the chairman has to stop you before you have been able to present your conclusions!

10) **Are You Nervous? Hopefully you are!**

Only very few of us have been born as a talented speaker. Almost everyone will be nervous before a presentation. For beginners, nervousness may easily lead to lack of confidence, caused by feelings of being inexperienced.

First time speakers often interpret nervousness as a sign that they are apparently incapable of delivering a good presentation. This is not true. All the symptoms that accompany nervousness, such as frequent swallowing, trembling, transpiration, etc. are signs that your body is getting ready for something important. Athletes, stage performers, musicians, and ... experienced speakers have learned to recognize these symptoms and to appreciate them. They start to worry when these symptoms stay away!

Experience is something that will come in time, by practicing and by analyzing your presentations and those by others. No one in the audience will blame you for being a beginner. However, if you take care to avoid a number of typical mistakes that beginners (and even experienced speakers) make, you will make a very good start with your career as a presenter. If you know and understand the basic principles and you know how to apply these, you are likely to give a talk that is significantly better than the average presentation at international meetings. Hence, lack of experience is not important provided you prepare your presentation well and you do your best to avoid the obvious mistakes listed in this brochure.

Finally, the ten steps we discussed all go back to two basic principles: First what is the message I want to convey, and second, how does the audience understand this message best. Awareness of how audiences listen and memorize is the key behind a presentation that will be appreciated by many.

DON'T LOOSE TIME AT THE START

Many speakers, even very experienced ones, unnecessarily loose time in the first few minutes.

- 1) If the chairman did his job appropriately there is no need to repeat the title, to explain who you are, or to repeat your affiliation. Showing all this information on a transparency is more than sufficient.
- 2) Other speakers noticeably have difficulty to get started. Apparently, the intended introductory statements do not come as spontaneously as the speaker hoped, maybe because of stage fear.

Note, that a good start of the talk is critically important in catching the audience's attention, you don't want to take any risks here. Hence, the best advice to speakers is to meticulously prepare for the first five minutes. Write this part out in short, powerful crystal clear sentences and rehearse them several times.

How to make a successful poster

A successful poster conveys a clear message by high-impact visual information and a minimum of text.

Posters have become one of the most important vehicles for presenting work at conferences. Poster sessions provide a wonderful forum to meet colleagues and discuss scientific work on a person-to-person basis. Unfortunately, a fairly large number of posters does not succeed in drawing significant attention. In this brochure we list some of the most frequent mistakes that presenters make and we make some recommendations for making efficient posters. A few nice examples are displayed at the EFCATS website: www.efcats.org.

What is a successful poster?

At the end of a meeting a poster can be considered successful if it conveyed a clear message to the visitors, and generated valuable comments to the presenter. In order to achieve these goals, the poster needs to be crystal clear about the objectives, the approach, the main results and the major conclusions of the work, and all this preferably within the proper perspective of existing knowledge on the particular subject.

Frequent mistakes

Too many posters do not succeed in getting their message across. Here are some of the main errors presenters make:

- **Too much text.** At the last EUROACAT meetings, roughly 65% of all posters had way too much text on it. Posters containing 2000 words or more were no exception!
- **Unclear structure.** If key elements such as objectives, approach, conclusions, or perspectives are missing, everyone who is not an insider on your subject will not understand why your poster is relevant (and why he/she should spend time on it).
- **Inappropriate structure.** Many people blindly apply the standard structure of a written report (see text box), thereby using their poster as a sort of miniature article, which almost automatically leads to a lot of text. There is no standard structure for a poster.
- **Poor figures.** Some figures may be real puzzles, with incomprehensible legends, secret codes, small lettering, and cryptical captions, etc. Note that many spreadsheet and data programs do not produce “reader friendly” graphics (see Figures 4 and 6).
- **Information overload.** Many presenters overload their posters with too many data, and greatly overestimate the time that the average visitor is willing to spend on the poster.
- **No presenter present.** This is obviously a missed chance for valuable discussions. Another frequent mistake is that presenters take a passive attitude and make no effort to initiate discussions.

ARTICLE STRUCTURE

- Abstract
- Introduction
- Experimental
- Results
- Discussion
- Conclusion

is not recommended for a poster

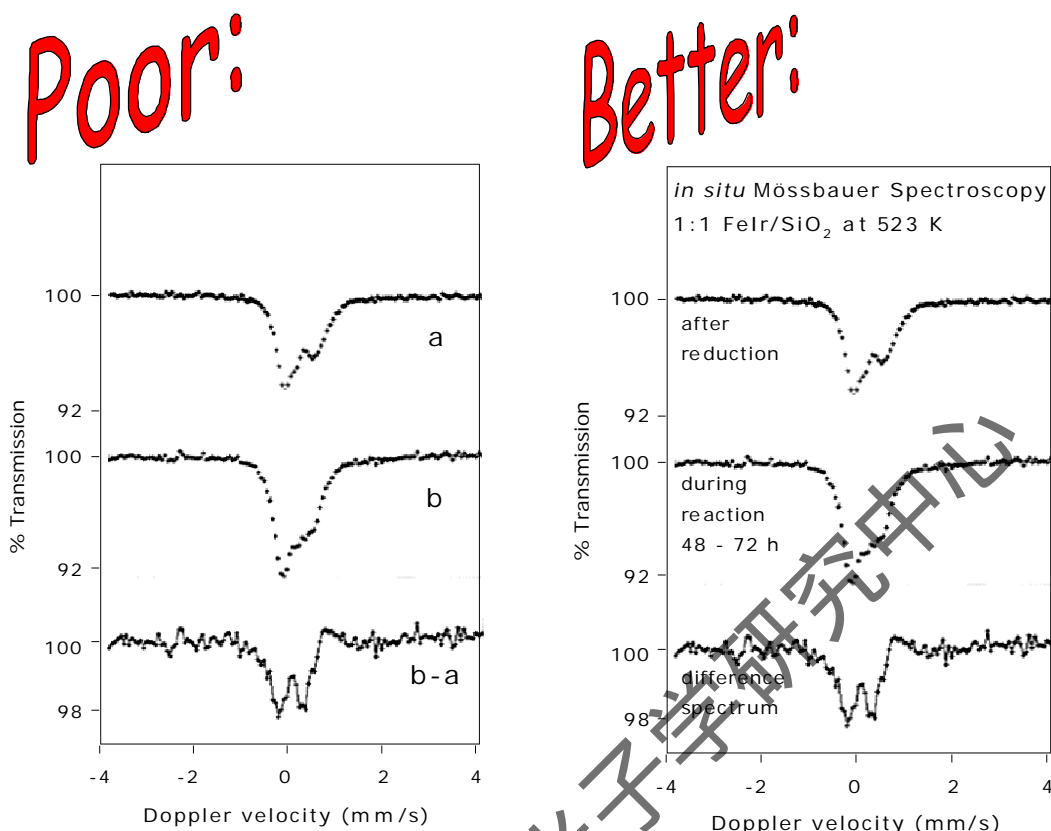


Figure 6 To understand the left figure one must read the caption; the right figure explains itself.

In five steps to an efficient poster

- 1) **The message of your poster.** Try to formulate the essence of what you want to present in a single sentence. Examples of such sentences are:
 - *I want to convince the audience that my new catalyst is the best one for converting methane into ethylene.*
 - *Analyzing kinetic data on reaction x with our microkinetic model enables one to define better processing conditions.*
 - *The new ABC technique yields reliable surface areas of supported oxide catalysts*
 Use this sentence as a guide for selecting the data you need to include. You probably won't actually print this sentence in the poster but it helps you to make up your mind and focus on what your poster is about.
- 2) **Introduction.** Write a few sentences of introduction to identify the problem you address, what is known about it, the objectives of your work and what your approach is to investigate the problem. Use short sentences and keep this section as concise as possible. Consider if complete sentences might be replaced by a bulleted list or by a graphic.
- 3) **Results.** Select the most pertinent results that support your message. Remove everything that is not absolutely necessary. Think about attractive ways to present the data in

figures. Try to avoid tables as much as possible. Figures and captions should be easy to read (see also Figures 4-6). Consider adding a brief conclusion below every figure.

- 4) **Conclusion.** Write the conclusions in short, clear statements, preferably as a list. Finish with an assessment of what you have achieved in relation to your objectives, and, perhaps, what your future plans are.
- 5) **Attention getters.** How are you going to draw the people's attention? An attractive title serves as such to some extent, but is not enough. Select one of your most important results, a photo, a scheme explaining the scientific background, a model or the main conclusion, or whatever you consider as highlight of your presentation and give it a prominent place on your poster, for example in the middle or at the beginning. This is what the audience will see first. It should raise their interest and stimulate them to read your poster.
- 6) **Layout.** Arrange all the parts of the poster around your attention getter. Add headers if necessary to clarify the structure of your poster, and add everything else that is needed, such as literature, acknowledgements. Ensure that author name(s) and affiliation are on the poster.
- 7) **Review, revise, optimize.** Ask your co-authors and/or colleagues to comment on a draft version of your poster. Assess very critically if the poster indeed conveys the message you want.

A good poster enables the reader to grasp the message in a short time, e.g. less than a minute. If he finds the subject of interest he will stay to learn about the details, and discuss the work with the presenter. If you fail to get the reader's attention in a short time, he is likely to go on to the next poster, unless he really wants to know about your work.

Finally

We hope that the recommendations in this brochure will help you to present effective talks and posters at future scientific meetings. Too many interesting pieces of research go lost because they are not presented properly. Yours will not, if you work on your presentations skills. Remember that this brochure does not intend to offer a standard template for talks or posters, you should develop your own presentation style. Just try to avoid the mistakes that so many of your colleagues (including experienced scientists, yes, even Nobel Prize winners) make.....

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Literature:

- P. Kenny, A Handbook of Public Speaking for Scientists and Engineers, Adam Hilger Ltd, Bristol, 1982.
- V. Booth, Communicating in Science: Writing a Scientific Paper and Speaking at Scientific Meetings, 2nd Edition, Cambridge University Press, Cambridge, 1993.
- M. Davis, Scientific Papers and Presentations, Academic Press, San Diego, 1996.

A checklist for analyzing oral presentations, and examples of posters can be found on www.efcats.org