GUIDANCE ON MAKING A RESEARCH POSTER

Purpose and General Approach

The main purposes of a research poster are to visually communicate research and to promote networking. To achieve this, you must understand how to use the medium to connect with your audience. A key barrier to connection is the 10–10 rule: most people spend only 10 seconds scanning a poster from a distance of 10 feet. To overcome the barrier, the content must be easily understood from a distance, and it must be engaging enough to command attention and compel the viewer to spend more time. You have 10 seconds to capture the attention of a viewer and inspire them to move closer and engage with the content. This starts with an interesting, informative title and continues with an easy-to-follow flow of information. The presentation must be visually pleasing and coherent, relying heavily on images (e.g., schemas, figures, and tables) complemented by judicious use of text that can be easily grasped.

The content of a poster is similar to that of a research article—a set of results that achieve a stated objective (or test a hypothesis) within the context of a broader problem that is changed, to some degree, by the reported results. In the case of a poster, however, the scope is limited to one main message with far fewer supporting details. The amount of information that can be presented is directly restricted by the available space. As a rule of thumb, use 40% of available space for graphics, 20% for text, and 40% for white space. This allocation highlights the two most common errors—too crowded and/or too much text—that result in posters that get very little interaction from the viewers. (Check out this example of an overloaded poster.)

Above all else, remember the key characteristic of a poster—visual communication. As you develop your poster, remember the following overarching principles:

- Entice viewers to linger and spend more time engaging with the material on your poster.
- Limit the scope and stick to one main message.
- Do not pack the space with too much content; leave some breathing room.
- Rely on graphics to do the talking and use as little text as possible.

Before You Start

FIRST, check the rules/guidelines for requirements such as use of a template, poster size and orientation, or specific formatting; refer to them throughout the process of making the poster. Follow the rules/guidelines to the letter.

SECOND, identify a printing facility. Check their requirements for electronic file format, confirm that they can produce the exact size you need, and determine their production time.

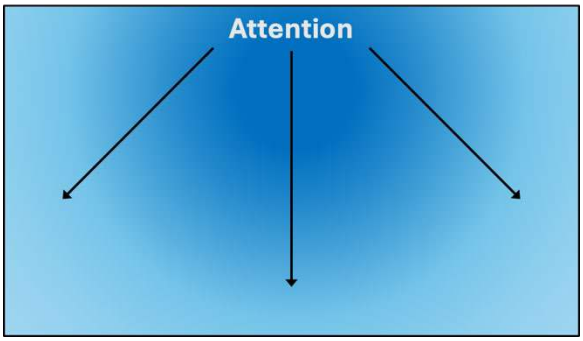
THIRD, establish your deadline. This will be determined by the printing facility's production time (add a few extra days in case of delays in printing or shipping) and the date of your event. Allow at least 1 month (preferably longer) to prepare the poster, get feedback, revise, get final feedback, and proofread.

Design Considerations

Because this is a visual medium, design choices will contribute heavily to the success of your poster. Keep in mind your goal—attract the attention of viewers from 10 feet away and entice them to move closer and to linger for more than 10 seconds. Research shows that viewers will first be drawn to content at the top and then they will begin to scan for images and colors. If the information they have encountered at that point is interesting (and readily comprehendible), they

may decide to invest more time in understanding the content. The main design elements that influence viewer engagement are layout, color, images, text, and scale.

Layout. The most fundamental design component is the layout, or the spatial organization of the various components. This should be guided by the way that attention naturally moves: it starts at the top and moves from the center outward and downward. Because the title (i.e., main message) and the results are the most important tools for pulling in an audience, they should be placed near the top and the center, and they must be engaging and easy to understand. Landscape orientation (i.e., horizontal) is recommended, if you have the freedom to choose, because viewers are less likely to read information below eye-level.



After a viewer is engaged with the content, they need visual cues to follow the flow of information. In the absence of other cues, people will follow from left to right, and from top to bottom. To help direct them through the content on the poster, use these general design principles:

- Divide the space into chunks with horizontal and/or vertical bars; empty space can also be used to separate sets of elements from each other.
- Group topics under simple but informative headings and subheadings.
- Prevent long horizontal spans of text by using columns.
- For cohesion, use a single sans serif font (e.g., Arial) and a consistent color scheme.

Color. Intelligent use of color is crucial for creating visual interest and cohesion rather than confusion and chaos. Use dark text on a light background and a palette of 2 to 3 colors that contrast well against each other and against the background. Use this scheme consistently throughout the poster, particularly within figures and graphs (e.g., in all figures, show the control in the same color).

Images. With a quick internet search, you can find many examples of “good” and “bad” posters that reinforce the main rule for creating a research poster: maximize visual elements and minimize text. Images not only create interest by drawing and holding attention, they also communicate information more efficiently than words. Because of the way the brain processes images, it can synthesize and retain visual information faster and easier than text. Look for opportunities to use images rather than text to communicate your messages. Think beyond data visualization and try to incorporate elements such as schemas, diagrams, or flow charts to show concepts such as hypotheses, workflows, and conceptual frameworks. Allow the images to speak for themselves—i.e., resist the temptation to use text to explain what should be conveyed in the image.

Resources and advice on creating effective visual elements are practically limitless. To prevent becoming overwhelmed, focus on the basic concept: construct figures and illustrations with an overall message that is clear, prominent, and self-explanatory. Highlight the main point with a succinct title or heading. Draw attention to the main features with formatting (e.g., size, color, bolding), graphic elements (e.g., arrows, asterisks), or words. Details can be incorporated for viewers who are interested in diving deeper, but they should not clutter the main message and typically will require the viewer to move in for closer inspection.

Use the following strategies to incorporate images into your poster:

- Go beyond data visualization—e.g., create images to represent information such as frameworks, models, and workflows.
- Use a meaningful title to summarize an image's main message or to interpret findings.
- Create images that are clear, self-explanatory, and uncomplicated; simplify the amount of detail.
- Use color to help communicate while also creating visual interest.
- Label graphics directly, but do not create clutter.
- In graphs and tables, eliminate unnecessary elements such as grid lines.

Text. By now, you probably have received the message to minimize the use of text (about 20% of available space). Text should not repeat what is shown in an image but should complement it. For example, bulleted text might accompany a figure to explain the importance of the data. When you do use text, keep it simple, easy to read, and engaging. Follow these guidelines:

- Limit the amount of written content (about 100 words per section).
- Use images instead of text as much as possible.
- Use clear wording, eliminate jargon, minimize acronyms.
- Include only necessary details.
- Use consistent wording, especially between text and visuals.
- Favor bullet points over paragraphs.

Scale. To attract viewers, the main features need to be legible from 10 feet; however, 3 to 5 feet is a reasonable reading distance for those who decide to stay and take in more of the content. Therefore, each element of the poster should be scaled appropriately for its purpose—elements most likely to spark interest (i.e., the title and key figures) should be largest, and elements with details of interest to deeply engaged viewers should be smallest. Keep in mind that "smallest" should be legible from about 5 feet, which would be considered fairly large in other settings.

For text, the following sizes are recommended:

- Title: 70–80 pt
- Section headings: 44–54 pt
- Secondary section headings or figure titles: 40–44 pt
- General text: 36–40 pt
- Figure/table legends: 28 pt

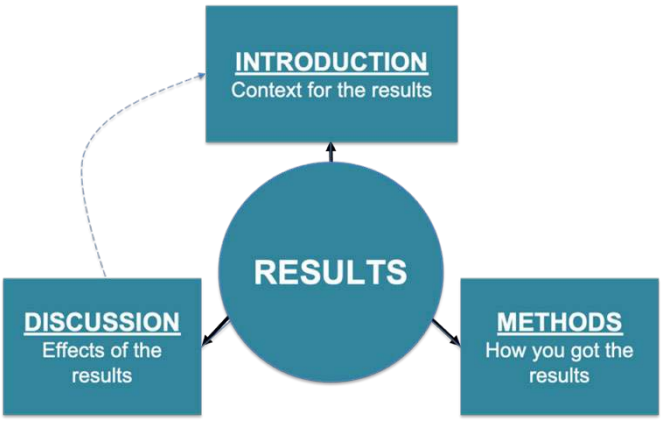
When working on a computer, it is challenging to judge the appropriate scale for a finished product that will be much larger than the screen. To help with this, print key images and blocks of text at 100% and tape them on the wall. Next, place a piece of colored tape on the floor 10 feet from the wall and another piece of tape 5 feet from the wall. Stand in each position and determine whether the material is too small, too large, or just right, taking into consideration whether it should be scaled for a viewer's initial pass (i.e., 10 feet) or for more careful evaluation and consideration (i.e., 3–5 feet). Adjust the scale as necessary and continue to evaluate until everything is just right. As you evaluate, pay close attention to appropriate scale for all text and details within figures. You may find that the image itself is the correct size, but labels within it are too small. In these cases, take the time to make the proper adjustments, rather than simply increasing the size of the entire image.

Draft Your Content

As you develop your poster, instead of working directly in the poster template, create and edit the content in separate master files (e.g., MS Word for text, PowerPoint for images). This will

allow you to copy and paste figures or blocks of text into the template with less potential for making a mess of the template. If a template is not provided, create your poster in the graphics software of your choice; most people use PowerPoint.

Beneath the top banner containing the title and author information, the main sections of a poster are Introduction, Methods, Results, and Discussion. Other components that are optional or that can be folded into the main sections include Objective (or Purpose), Conclusion(s), Abstract, References, and Acknowledgements. Advice for each of these topics is detailed below, **in the order that is recommended for developing your content**. As shown in the figure, all content must align with the results you present; therefore, the Results section is the best place to start when developing your content.

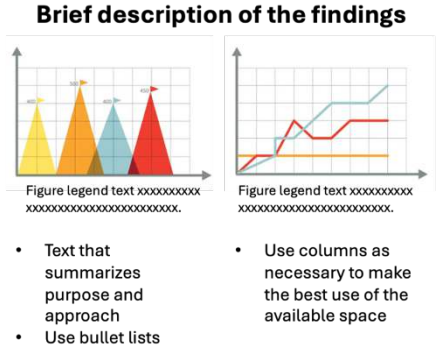


Results. The results section will occupy the most space on the poster; it will house most of the images and information. A good poster will effectively organize the images and text so that the purpose and general design of an experiment or analysis can be readily grasped, the data can be easily understood and evaluated, and the flow from one set of data to the next is effortless and logical.

Everything on the poster stems from the results, so begin by selecting the set of results that you want to present and then create figures and tables that clearly communicate the data, according to sound design strategies. The most common mistake is to include too much. As you design your poster, continue to ask yourself whether you need to scale back on the amount of information you are trying to include—do not fall into the trap of cramming in too much information. Your poster should efficiently and effectively communicate only the main findings.

After you have selected the data and constructed the figures and tables, assemble them in a logical order. Write succinct statements that summarize the main findings and that collectively build toward a broad overall conclusion; these statements will be used as subheadings within the results section. Note that one subheading often is supported by a set of figures/tables. For each subsection, write bullet points that succinctly state the purpose of the experiment or analysis and an overview of the approach taken. Do not repeat information from the subheading, tables, figures, legends, or methods section; instead, provide enough information for the viewer to evaluate the validity of the data and of the conclusions (e.g., techniques used, features of groups compared, outcomes measured).

Construct each subsection as a visually cohesive unit of text and images, with a subheading across the top (see example in the figure). Arrange all subsections within the results section so that the viewer is visually guided from one to the next in a logical progression, moving from left to right and from top to bottom. Leave empty space around each subsection to clearly identify it as a separate unit.



Objective. Collectively, your results should achieve an overarching objective, solve a problem, test a hypothesis, or answer a central question. Clearly and succinctly state this objective, problem, hypothesis, or question. Carefully evaluate the data and the broad descriptions of the results (i.e., subheadings) and then make sure that they come together to achieve the stated purpose; revise as needed. This objective may be embedded within the introduction section, rather than under its own heading, but it must be prominent and clearly identifiable (e.g., with use of bold or bulleting).

Introduction. Together with the objective, the introduction communicates the importance and rationale of the main message. The content should establish, in a brief paragraph or a bullet list, the broader setting or context of your objective. When possible, use illustrations instead of words (e.g., to show a process, model, or hypothesis). The goal is to compel the viewer to further engage with your poster. If the work being presented tested a hypothesis, then you must state the hypothesis here or as the objective.

Conclusion(s). Create one or two take-home messages that sum up the results. These conclusions must directly address your stated hypothesis and/or objective. This can be its own section or embedded within the discussion section, but it must be prominently presented (see Objective, above).

Discussion. The main purpose of the discussion section is to interpret your results within the context of the current literature. Succinctly describe the main ways in which your results are consistent with and/or contradictory to what is currently known; bullet points usually work well. State the primary limitations and describe how the work can be extended in the future. Make sure that the larger context described here is consistent with that in the introduction section.

Title and Author Information. A good title is crucial—if a viewer is not interested by the title, they may keep walking without looking at anything else on the poster. Therefore, put some thought and work into your title, and get feedback from peers and mentors. The purpose of the title is to capture attention and summarize the main message of the study. The rest of the poster should support that message through its content and presentation. A good title is succinct (under 10 words) and easy to comprehend, and it should say something about the main results. It is a good idea to write the title at the end of the process because it must relate to the objective, results, and conclusion.

Under the title, list all authors. Determine authorship according to the same principles as for a publication (see ICMJE guidelines). Under the list of authors, list their institutional affiliations. Include contact details for the appropriate person. Within the top banner, it is customary to also include the name and logo of the institute or center where the work was conducted.

Materials and Methods. Although it is important to describe the methods you use to get the results, this is probably the part of your poster that the fewest people will read and that will impact them the least. For these reasons, do not waste a lot of space or prime location for this topic; tuck it into a lower area of the poster. Do not repeat information from other parts of the poster.

Focus on the design of the experiments, so viewers can determine whether it is adequate to achieve the study's objective. Try to replace text with visual elements, such as flow charts and graphics. Include the basic parameters, such as setting, features of experimental and control groups, and interventions, as well as outcome measures and statistical techniques. Name the methodologies used, but do not provide methodological details.

Abstract. Do not waste space by including an abstract on the poster (unless you are required to do so) because the entire poster is essentially a visual abstract. Most events will, however,

require that you submit an abstract to be included in their materials for participants (e.g., conference website or printed programs). To write the abstract, summarize the main points from all sections above.

References. Because references use a lot of space but contribute little to the viewer's experience, cite only those that are most important. Use a small size font and place them at the bottom of the poster. Some people choose to eliminate references from the poster itself and, instead, include them on a separate document with the poster's title and authors (you may also choose to add the abstract to this document). This can be a physical handout, an electronic file (linked with a QR code on the poster), or both.

Acknowledgements. Acknowledge people (who do not qualify for authorship) or resources that contributed to the research or the poster. Use a small size font and place this text near the bottom, with the references.

Presentation

Develop and practice a succinct (3–5 sentences) description of the work that you can present during your poster session. This should be a starting point for an engaging conversation. First, describe the purpose of the work and give the overall conclusion; this can be done in a single sentence. Next, briefly (1–2 sentences) describe the why the work is important. Finally, use the poster to illustrate the points that led to the conclusion. When someone is interested in hearing more, describe how the main conclusions are relevant to the field, what the main limitations were, and how the work can be further developed. Keep a friendly, professional, and confident tone, and do not panic when someone asks a question that you cannot answer—the purpose of science is to keep pursuing unanswered questions!

General Resources

Erren TC, Bourne PE. Ten simple rules for a good poster presentation. PLoS Comput Biol. 2007;3(5):e102.

Gundogan B, Koshy K, Kurar L, Whitehurst K. How to make an academic poster. Ann Med Surg (Lond). 2016 Sep 6;11:69–71.

Hamilton CW. At a glance: a stepwise approach to successful poster presentations. Chest. 2008;134(2):457–4599.

https://www.training.nih.gov/creating-a-scientific-poster/#resources-to-help-you-prepare

Persky AM. Scientific Posters: A Plea from a Conference Attendee. Am J Pharm Educ. 2016 Dec 25;80(10):162.

Shelledy DC. How to make an effective poster. Respir Care. 2004;49(10):1213–1216.

Resources on Visual Elements

Data visualization Design: https://www.columnfivemedia.com/25-tips-to-upgrade-your-data-visualization-design/