both your writing and your work. The final version of the paper can be considerably strengthened by using the comments of a good reviewer.

## ► How to deal with comments that you do not agree with

If the suggested changes seem unnecessary or, with good reason, unacceptable to you, then the editor can be given a reasoned argument as to why you believe that a particular change need not be made. There are several things you need to address when evaluating a comment from a reviewer.

- Does the fault lie with you or the reviewer? Some reviewers' comments may show that they have misunderstood or misinterpreted your material. You then have to establish whether this is because you have not explained it well enough or the reviewer does not know what he or she is talking about. It is easy in the heat of the moment to assume the latter, but it needs careful reflection.
- *Is the reviewer possibly not an expert in the field?* The reviewers may not be the ultimate authorities on your topic. This may be no fault of the editor; it is extremely difficult to find appropriate reviewers for each of the hundreds of manuscripts that an editor has to deal with each year.
- Are the remarks trivial? In a few cases, you may have just cause to feel peeved. Some reviewers, if they are unable to make substantive comments, feel the need to justify their appointment by pointing out minor errors, for example, in the wording. Such comments can often reflect personal quirks and may not make for valid comments.
- Are the comments dull, mechanical, or generalized? A comment such as "Poorly organized" with no suggestions as to how it could be improved is a useless comment. A reviewer who is not lazy will make comments that are specific and will show a real interest in your topic.
- Are all of a reviewer's comments negative? This means either that the reviewer thinks your paper has no worth or that the reviewer is prejudiced or is trying to impress the editor.

Whatever your conclusions about the reviewers in terms of these questions, you cannot use words such as "lazy," "trivial," or "useless" in your rebuttal. If you decide not to abide by a reviewer's suggested amendment, you need to send the editor a calm, well-reasoned, and well-written defense that avoids pejorative terms. Your arguments should be contained in the formal cover letter when you resubmit your amended manuscript to the editor.

The editor will take note of your argument. If your facts are correct and your reasoning is sound, he or she will be able to use your argument as justification for reversing a negative decision.

If the reports from two assigned reviewers are contradictory, you can ask the editor for a third reviewer.

# 12.1.8 Resubmission of the manuscript in its amended version

Send the required numbers of copies of your amended manuscript and the file on disk to the editor. Your cover letter should indicate whether you have incorporated the reviewers' suggestions and should give reasoned arguments if you have rejected any.

# 12.1.9 If your paper has been accepted

The next stage is to receive the typeset version to proofread. This needs to be done meticulously; you will need to correct it using standard proofreading symbols (see Section 16.4).

Alternatively, the editorial staff of the journal may do the final proofreading.

## 12.1.10 If your paper has been rejected

Examine it very critically, alter it as you think necessary, and submit it to another journal.

# **12.2** The structure of a journal or conference paper

A journal paper often follows the classic Abstract, Introduction, Materials and Methods, Results, and Discussion (AIMRAD) pattern in its general format. Many papers will need these actual sections; others will need to contain the basic skeleton and follow the scheme in its general plan. It is essential to follow the journal's Instructions to Authors for structure and format.

# 12.3 Requirements for the sections of a journal or conference paper

# 12.3.1 Title

### Purpose

To give the reader immediate access to the subject matter of the paper.

### Guidelines for writing it

A title should be informative, not a generalized overview. Keywords are critical. You need to imagine how another person would look for this kind of information in a database. It would be a mistake to believe that a general title will suffice for a journal paper and that the list of keywords will indicate the specifics of the work. Many people choose papers to read from the titles in a List of References; an inadequate title may not be followed up.

A title can have various forms. A **hanging title** is when a colon or dash joins parts of the title. This is a useful way of avoiding a long, grammatically difficult title. Either the first or the second part of the title can be used to describe the overall area; the other part gives more specific material:

Applications of Drag-Reducing Polymers in Sprinkler Irrigation Systems: Sprinkler Head Performance

Some journals allow the use of **questions** in the title.

How Much Do Road Accidents Cost the National Economy?

Questions can also be used as the second part of a hanging title.

Modeling Drainage Performance in Slums of Developing Countries: How Good Is Good Enough?

Some journal editors do not like **series titles**. If the various papers appear in different journals, there are problems with the timing of publication, with the result that papers can become out of sequence. However, they are still sometimes used, particularly when the individual papers of the series are published simultaneously in the same edition of the journal.

Effects of Electroosmosis on Soil Temperature and Hydraulic Head. I: Field Observations

Effects of Electroosmosis on Soil Temperature and Hydraulic Head. II: Numerical Simulation

**Running titles (running heads)** are the short titles required by journals for the tops of the pages. In contrast to the main title, running titles can use accepted abbreviations.

#### Full title

Dynamic Interpretation of Slug Tests in Highly Permeable Aquifers

#### Running title

Slug Test Interpretation

Abbreviations in the main title should be widely known in your discipline. Many journals have a list of the abbreviations they will accept.

Ensure that the title makes sense. The structure may be lost during the quest for the minimum number of words.

## 12.3.2 Authorship and affiliation

#### Purpose

To show the people who did the work presented in the paper, the institutions where it was done, and, if they have changed, the present addresses of the authors.

The journal's Instructions to Authors will define how to present the author/ affiliation information.

# 12.3.3 Abstract

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## Purpose

To give the reader a miniaturized version of the paper: all of the key information—objective of the work, methods, results, and conclusions. For full details, see Section 6.9.

# 12.3.4 Keywords

This is a short list of words relevant to the work that will be used by electronic indexing and abstracting services. It is important to determine the keywords that a potential reader might use to search for information. The list should include both general and specific items.

# 12.3.5 Introduction

## Purpose

- To clearly state the purpose of the study.
- To allow readers to understand the background of the study without requiring them to consult the literature themselves.
- To identify the authors who have worked or are working in this area and to describe their chief contributions.
- To point out the relationships between the various authors' works.
- To indicate correlations, contradictions, ambiguities, and gaps in the knowledge.
- To outline the approach you have taken with respect to the correlations, contradictions, ambiguities, and gaps.
- To provide a context for the later discussion of the results.

## **Guidelines for writing it**

The first sentence should provide an overall introduction, specific to the work described in the paper. Avoid making a banal statement of general knowledge or resorting to a trite statement of the obvious. For example:

Toxic waste is a very serious problem in the world today.

Even pompously dressing it up cannot disguise a banality:

The quantity of toxic waste currently generated in the world is a problem of the utmost seriousness.

The main purpose of the work should be clearly stated in the Introduction. Many readers point out that this is often missing or difficult to determine.

Review the literature and show the relationships between the various areas of work. Show the background of the previous work in this area. Show the contributions of others, with correct reference citations of

their work. The references cited should be carefully chosen to provide the most important background information.

- Show where there are correlations, contradictions, ambiguities, and gaps in the knowledge. Show the scope of the problem and how your work will address these issues.
- Make it simple and brief, but keep your reader adequately informed.
- Define the specialized terms used in the paper.

### Structuring the Introduction

The Introduction tells a story—it should have a logical flow:

- *The beginning:* Briefly summarize relevant current knowledge, supporting your statements with references as necessary.
- *The middle:* Describe what is not known (or a problem with the known). Having summarized the established facts, move on to areas where there is less or no knowledge, or where the evidence is conflicting.
- *The end:* In the final paragraphs, clearly state the purpose of the work then briefly summarize your approach, if this is appropriate.

Every study sets out to solve a specific research problem. This should be stated explicitly in the final paragraph of the Introduction. Make sure it follows logically from the preceding sentences; these should have been structured so that the gaps or controversies in the knowledge are obvious. Use signaling words and phrases to introduce the purpose:

However, it is not known whether . . . To answer this question (*such and such*) was investigated . . . To clarify the role of X in Y, . . . To determine whether . . . To compare the properties of A and B . . .

Having stated the purpose of your work, it is sometimes appropriate to very briefly state how you did it.

## Tense of the verb for the Introduction

See the Quick Reference Guide: Parts of Speech and Verb Forms (Part 7) for guidelines for using tense in technical documents and definitions and examples of the various tenses of the verb.

Use a mixture of present and past tenses: the present tense to describe the established body of knowledge and existing situations, the past tense for people's findings.

### Example to show use of present and past tenses in an Introduction

The resistance of buildings to wind pressure has been (*past tense*) the subject of considerable research. Normal design loads are (*present, established knowledge*) substantially lower than those that can occur in a severe windstorm. Furthermore, many common construction practices produce (*present, existing situation*) connections that are inadequate to resist loads in such severe windstorms. The development of retrofit options for improving the connection between building components has been (*past*) the subject of previous research. Results have been used

(*past*) to develop the recommendations for improving the attachment of sheathing and for strengthening structural connections presented in this paper.

Adapted from Reinhold, T. A., Schiff, S. D., Rosowsky, D. V., and Sill, B. L. (2002). "Case for enhanced in-home protection from severe winds." *Journal of Architectural Engineering*, **8** (2), 60–68.

• Use the past tense for specific findings that you are going to dispute.

### Example

Jones and Brown reported that airborne pollution was *(past)* not responsible for acid rain. However, other studies have not confirmed this finding.

## **Common mistakes**

- The main point is not clearly obvious—the reason for doing the study is not clear.
- The literature has not been adequately reviewed. For example, the pivotal references may not have been cited; only a few references may have been cited for a thoroughly researched area of work; the correlations and contradictions may not have been pointed out.
- Excessive length and rambling, unspecific, unstructured, irrelevant material.
- Insufficient length with overly general material.
- Does not summarize the approach taken.
- Specialized terms are not defined.

# 12.3.6 Materials and Methods or Procedure

This section is often the easiest part of a document to write. Describing experimental methods is usually very straightforward. Therefore it is often the best place to start writing. There is no need to write a paper in sequence from beginning to end. Start with the section that is going to give you the fewest problems.

## Purpose

- To describe your experimental procedures.
- To give enough detail for a competent worker to repeat your work.
- To describe your experimental design.
- To enable readers to judge the validity of your results in the context of the methods you used.

## **Guidelines for writing it**

- Logically describe the series of experimental steps so that a competent worker in your field could repeat the whole procedure.
- Ask yourself whether you might be too familiar with the techniques. You might make the mistake of leaving out descriptions of procedures that are essential but which you take for granted. If you think this is the case, give your description to a colleague to read.
- Make sure that some of the results are not accidentally introduced. The Materials and Methods section and the Results section need to be very

strongly separated from each other in their contents. However, if you need the results of one experiment to justify using the subsequent methods, it should be acceptable to say so, briefly.

- Summarize established techniques; novel techniques or variations on an old technique should be fully described.
- Tables can also be used in the Materials and Methods; they do not belong only in the Results. A table is often the best way to describe a complex procedure.
- If you are following the conventional AIMRAD format, use subheadings. When possible, use subheadings that match those that will be used in the Results. The reader can then correlate a particular method with the related results.
- Most academic assessors and journal editors allow the occasional use of We in an active construction.
- When you need to cite a technique, cite the earliest reference in which this form of the technique was used.

If you have to refer to the literature to explain a technique, give enough information for the reader to get an outline of the technique.

#### Good

Specimens were concrete prisms with a deformed bar embedded at their center of the cross section and carbon fiber sheets externally bonded to their two side surfaces.

#### Poor

Specimens were prepared as previously described (Ueda et al., 2004)

### Tense of the verb

See the Quick Reference Guide: Parts of Speech and Verb Forms (Part 7) for guidelines for using tense in technical documents and definitions and examples of the various tenses of the verb.

For experimental work, use the past tense. You are describing work that you did.

#### **Correct**

Ten columns served as reference and were tested without any strengthening.

#### Incorrect

Ten columns serve as reference and are tested without any strengthening.

► For description of geographic or geologic features, use the present tense.

#### Example

All three paleosols show a greater degree of development than the surface soils. Better development is displayed in terms of greater clay accumulation, higher structural grade, harder consistency, and thicker profiles.

### Common mistakes

• Not enough critical detail to enable someone unfamiliar with the method to repeat it. It probably happens because the techniques are too familiar.

- Too much unnecessary detail.
- Detailed text where an illustration would be more appropriate.
- Illogical description. This may happen when several procedures are described together.
- Being referred back to the literature with not enough summarized information to be able to understand the method.
- Introducing some of the results.

# 12.3.7 Results

The Results section is the core section of the document because it presents new knowledge. Data is provided in figures and tables that accompany the text.

## Purpose

To present your results, but not to discuss them, giving readers enough data to draw their own conclusions about the meaning of your work.

## Guidelines for writing it

Highlight the most important aspects of the results in the text of the Results section. You need to guide the reader to decide what to look for in the tables and figures. A Results section should not be made up solely of illustrations; there must also be explanatory text linking them. For example, to show the behavior of various types of panels under load, it is not sufficient to present only a graph. The main features also need to be pointed out in the main text:

## Example

The panels with angle-ply reinforcement behaved similarly to the central panels and showed no significant increase in load capacity (Figure 4).

- ► Make illustrations as self-explanatory as possible by means of good titles and captions. After reading only the title and Abstract, readers familiar with the topic will often turn next to the Results section. Moreover, studies of how journal papers are read show that many readers first look at the illustrations in the Results section before reading the text.
- Ensure a logical flow. If interrupted by material that is too detailed or is not directly relevant, your readers are going to become disoriented and lose the thread.
- Present data in only one way. Do not repeat in the text data that are also presented in a table or graph.
- Limit the amount of detail: You do not need to include every item of data you obtained despite the hard work needed to obtain it. It should not be a blow-by-blow diary of work done. In any piece of research, there inevitably will be results that are not worth presenting.
- Avoid presenting repetitive data. Give representative data, and state that they are representative.

- It is important to include anomalous results that do not support your hypothesis.
- If subheadings are used, they should—if possible—match those used in the Materials and Methods.
- Do not discuss the results. Leave this for the Discussion. Editors will demand a complete separation of the material in the Results and the Discussion sections. If the journal allows it, consider using the useful section "Results and Discussion."
- The Results section is the next easiest section to write, after the Methods section. It is therefore time-efficient to write the Results as soon as you have finished the Methods.

### **Common faults**

- Inadequate textual description. The trends are not pointed out and readers are left to deduce the results from the illustrations.
- Too much detail. Readers do not need every item of data collected.
- Illustrations that are not self-explanatory, due to inadequate subtitling and captioning.
- Repetition in the text of data already shown in the figures and tables.
- Using too many words when citing figures and tables.

#### Incorrect

It is clearly shown in Table 2 that . . .

#### Correct

Table 2 shows that . . . . . . . (Table 2).

### Tense of the verb

See the Quick Reference Guide: Parts of Speech and Verb Forms (Part 7) for guidelines for using tense in technical documents and definitions and examples of the various tenses of the verb.

Use the past tense. You are describing the results you obtained.

#### Example

More rupture occurred within the embedded part than in the free zone.

# 12.3.8 Discussion

### Purpose

- To give the answer to the research problem that was stated in the Introduction.
- To explain how the results support the answer.
- To show the relationships among your observations and to place them into the context of other people's work.
- To draw conclusions.

## **Guidelines for writing it**

- Describe the significance of the work: principles, relationships, and generalizations.
- State your conclusions as clearly as possible.
- Discuss the material; do not just restate it.
- Point out any exceptions, or any lack of correlation, and define unsettled points.
- Show how your results and interpretations agree or contrast with previously published work.
- Do not avoid discussing anomalous data; it will be obvious to an expert reader. Be open and honest about inconsistencies or gaps in the data.
- ► Summarize your evidence for each conclusion. Never assume anything.
- ► Keep all your speculation within reasonable bounds.
- Do not be afraid to defend your conclusion. But in doing this, treat other studies with respect.
- State any limitations of your methods or study design.
- State any important implications.
- Overall structure for the Discussion: The beginning (state the aim again and briefly summarize the results); the middle (relate your work to that of others, acknowledge anomalies or limitations of your work, form supported conclusions); the end (present the main conclusion and its implications in the last paragraph).

## **Choice of words**

"Prove" is too strong a word. Reviewers prefer the conclusions to be stated less equivocally. In descending order of strength:

These results show/demonstrate	Very positive.
These results indicate	Slightly less strong.
These results suggest/imply	Useful if you want to introduce a slight element of doubt or as a politeness if your results contradict a body of evidence.
These results support	Useful if you need to demonstrate agreement with a hypothesis or someone else's work.

"Appear" can be used to avoid sounding too dogmatic:

Thus, XYZ appears to be essential for . . . sounds positive but much less dogmatic than Thus, XYZ is essential for . . .

► It is acceptable to use hedging words; science is rarely cut-and-dried.

may be; might be; could be; probably; possibly

But don't go to extremes of hedging

## Acceptable

These results suggest that A is the cause of B. These results suggest that A may be the cause of B.

### Too cautious

These results suggest the possibility that A may be the cause of B.