

Writing the Empirical Journal Article

Daryl J. Bem

Cornell University

Planning Your Article	2
Which Article Should You Write? 2	
Analyzing Data 2	
Reporting the Findings 3	
How Should You Write? 3	
For Whom Should You Write? 3	
Writing Your Article	4
The Shape of An Article 4	
The Introduction 5	
The Opening Statements 5	
Examples of Examples 6	
The Literature Review 6	
Citations 6	
Criticizing Previous Work 7	
Ending the Introduction 7	
The Method Section 7	
The Results Section 8	
Setting the Stage 8	
Presenting the Findings 9	
Figures and Tables 10	
On Statistics 10	
The Discussion Section 10	
The Title and Abstract 11	
Rewriting and Polishing Your Article	12
Some Matters of Style	13
Omit Needless Words 13	
Avoid Metacomments on the Writing 14	
Use Repetition and Parallel Construction 14	
Jargon 15	
Voice and Self-Reference 15	
Tense 15	
Avoid Language Bias 16	
Research Participants 16	
Sex and Gender 16	
Racial and Ethnic Identity 17	
Sexual Orientation 17	
Disabilities 18	
Common Errors of Grammar and Usage 18	
<i>Compared with</i> versus <i>Compared to</i> 18	
<i>Data</i> 18	
<i>Different from</i> versus <i>Different than</i> 18	
<i>Since</i> versus <i>Because</i> 18	
<i>That</i> versus <i>Which</i> 18	
<i>While</i> versus <i>Although, But, Whereas</i> 18	
Publishing Your Article	18
References	20

A version of this article appears in Darley, J. M., Zanna, M. P., & Roediger III, H. L. (Eds) (2003). *The Compleat Academic: A Practical Guide for the Beginning Social Scientist, 2nd Edition*. Washington, DC: American Psychological Association.

You have conducted a study and analyzed the data. Now it is time to write. To publish. To tell the world what you have learned. The purpose of this article is to enhance the chances that some journal editor will let you do so.

If you are new to this enterprise, you may find it helpful to consult two additional sources of information. For detailed information on the proper format of a journal article, see the *Publication Manual of the American Psychological Association* (APA, 2001) and recent articles in the journal to which you plan to submit your manuscript. For renewing your acquaintance with the formal and stylistic elements of English prose, you can read Chapter 2 of the *Publication Manual* or any one of several style manuals. I recommend *The Elements of Style* by Strunk and White (2000). It is brief, witty, and inexpensive.

Because I write, review, and edit primarily for journals in personality and social psychology, I have drawn most of my examples from those areas. Colleagues assure me, however, that the guidelines set forth here are also pertinent for articles in experimental psychology and biopsychology. Similarly, this article focuses on the report of an empirical study, but the general writing suggestions apply as well to the theoretical articles, literature reviews, and methodological contributions that also appear in our journals. (Specific guidance for preparing a literature review article for *Psychological Bulletin* can be found in Bem, 1995.)

Planning Your Article

Which Article Should You Write?

There are two possible articles you can write: (a) the article you planned to write when you designed your study or (b) the article that makes the most sense now that you have seen the results. They are rarely the same, and the correct answer is (b).

The conventional view of the research process is that we first derive a set of hypotheses from a theory, design and conduct a study to test these hypotheses, analyze the data to see if they were confirmed or disconfirmed, and then chronicle this sequence of events in the journal article. If this is how our enterprise actually proceeded, we could write most of the article before we collected the data. We could write the introduction and method sections completely, prepare the results section in skeleton form, leaving spaces to be filled in by the specific numerical results, and have two possible discussion sections ready to go, one for positive results, the other for negative results.

But this is not how our enterprise actually proceeds. Psychology is more exciting than that, and the best journal articles are informed by the actual empirical findings from the opening sentence. Before writing your article, then, you need to Analyze Your Data. Herewith, a sermonette on the topic.

Analyzing Data. Once upon a time, psychologists observed behavior directly, often for sustained periods of time. No longer. Now, the higher the investigator goes up the tenure ladder, the more remote he or she typically becomes from the grounding observations of our science. If you are already a successful research psychologist, then you probably haven't seen a participant for some time. Your graduate assistant assigns the running of a study to a bright undergraduate who writes the computer program that collects the data automatically. And like the modern dentist, the modern psychologist rarely even sees the data until they have been cleaned by human or computer hygienists.

To compensate for this remoteness from our participants, let us at least become intimately familiar with the record of their behavior: the data. Examine them from every angle. Analyze the sexes separately. Make up new composite indexes. If a datum suggests a new hypothesis, try to find additional evidence for it elsewhere in the data. If you see dim traces of interesting patterns, try to reorganize the data to bring them into bolder relief. If there are participants you don't like, or trials, observers, or interviewers who gave you anomalous results, drop them (temporarily). Go on a fishing expedition for something—anything—interesting.

No, this is not immoral. The rules of scientific and statistical inference that we overlearn in graduate school apply to the "Context of Justification." They tell us what we can conclude in the articles we write for public consumption, and they give our readers criteria for deciding whether or not to believe us. But in the "Context of Discovery," there are no formal rules, only heuristics or strategies. How does one discover a new phenomenon? Smell a good idea? Have a brilliant insight into behavior? Create a new theory? In the confining context of an empirical study, there is only one strategy for discovery: exploring the data.

Yes, there is a danger. Spurious findings can emerge by chance, and we need to be cautious about anything we discover in this way. In limited cases, there are statistical techniques that correct for this danger. But there are no statistical correctives

for overlooking an important discovery because we were insufficiently attentive to the data. Let us err on the side of discovery.

Reporting the Findings. When you are through exploring, you may conclude that the data are not strong enough to justify your new insights formally, but at least you are now ready to design the “right” study. If you still plan to report the current data, you may wish to mention the new insights tentatively, stating honestly that they remain to be tested adequately. Alternatively, the data may be strong enough to justify recentering your article around the new findings and subordinating or even ignoring your original hypotheses.

This is not advice to suppress negative results. If your study was genuinely designed to test hypotheses that derive from a formal theory or are of wide general interest for some other reason, then they should remain the focus of your article. The integrity of the scientific enterprise requires the reporting of disconfirming results.

But this requirement assumes that somebody out there cares about the hypotheses. Many respectable studies are explicitly exploratory or are launched from speculations of the “I-wonder-if ...” variety. If your study is one of these, then nobody cares if you were wrong. Contrary to the conventional wisdom, science does not care how clever or clairvoyant you were at guessing your results ahead of time. Scientific integrity does not require you to lead your readers through all your wrong-headed hunches only to show—voilà!—they were wrongheaded. A journal article should not be a personal history of your stillborn thoughts.

Your overriding purpose is to tell the world what you have learned from your study. If your results suggest a compelling framework for their presentation, adopt it and make the most instructive findings your centerpiece. Think of your dataset as a jewel. Your task is to cut and polish it, to select the facets to highlight, and to craft the best setting for it. Many experienced authors write the results section first.

But before writing anything, Analyze Your Data!

End of sermonette.

How Should You Write?

The primary criteria for good scientific writing are accuracy and clarity. If your article is interesting and written with style, fine. But these are subsidiary virtues. First strive for accuracy and clarity.

The first step toward clarity is good organization, and the standardized format of a journal article does much of the work for you. It not only permits readers to read the report from beginning to end, as they would any coherent narrative, but also to scan it for a quick overview of the study or to locate specific information easily by turning directly to the relevant section. Within that format, however, it is still helpful to work from an outline of your own. This enables you to examine the logic of the sequence, to spot important points that are omitted or misplaced, and to decide how best to divide the labor of presentation between the introduction and final discussion (about which, more later).

The second step toward clarity is to write simply and directly. A journal article tells a straightforward tale of a circumscribed problem in search of a solution. It is not a novel with subplots, flashbacks, and literary allusions, but a short story with a single linear narrative line. Let this line stand out in bold relief. Don’t make your voice struggle to be heard above the ambient noise of cluttered writing. You are justifiably proud of your 90th percentile verbal aptitude, but let it nourish your prose, not glut it. Write simply and directly.

For Whom Should You Write?

Scientific journals are published for specialized audiences who share a common background of substantive knowledge and methodological expertise. If you wish to write well, you should ignore this fact. Psychology encompasses a broader range of topics and methodologies than do most other disciplines, and its findings are frequently of interest to a wider public. The social psychologist should be able to read a *Psychometrika* article on logistic analysis; the personality theorist, a biopsychology article on hypothalamic function; and the congressional aide with a BA in history, a *Journal of Personality and Social Psychology* article on causal attribution.

Accordingly, good writing is good teaching. Direct your writing to the student in Psychology 101, your colleague in the Art History Department, and your grandmother. No matter how technical or abstruse your article is in its particulars, intelligent nonpsychologists with no expertise in statistics or experimental design should be able to comprehend the broad outlines of what you did and why. They should understand in general terms what was learned. And above all, they should appreciate

why someone—anyone—should give a damn. The introduction and discussion sections in particular should be accessible to this wider audience.

The actual technical materials—those found primarily in the method and results sections—should be aimed at a reader one level of expertise less specialized than the audience for which the journal is primarily published. Assume that the reader of your article in *Psychometrika* knows about regression, but needs some introduction to logistic analysis. Assume that the reader of the *Journal of Personality and Social Psychology* knows about person perception but needs some introduction to dispositional and situational attributions.

Many of the writing techniques suggested in this article are thus teaching techniques designed to make your article comprehensible to the widest possible audience. They are also designed to remain invisible or transparent to your readers, thereby infusing your prose with a “subliminal pedagogy.” Good writing is good teaching.

Writing Your Article

The Shape of an Article

An article is written in the shape of an hourglass. It begins with broad general statements, progressively narrows down to the specifics of your study, and then broadens out again to more general considerations. Thus:

The introduction begins broadly:	“Individuals differ radically from one another in the degree to which they are willing and able to express their emotions.”
It becomes more specific:	“Indeed, the popular view is that such emotional expressiveness is a central difference between men and women.... But the research evidence is mixed...”
And more so:	“There is even some evidence that men may actually...”
Until you are ready to introduce your own study in conceptual terms:	“In this study, we recorded the emotional reactions of both men and women to filmed...”
The method and results sections are the most specific, the “neck” of the hourglass:	(Method) One hundred male and 100 female undergraduates were shown one of two movies... “(Results) Table 1 shows that men in the father-watching condition cried significantly more...”
The discussion section begins with the implications of your study:	“These results imply that sex differences in emotional expressiveness are moderated by two kinds of variables...”
It becomes broader:	“Not since Charles Darwin’s first observations has psychology contributed as much new...”
And more so:	“If emotions can incarcerate us by hiding our complexity, at least their expression can liberate us by displaying our authenticity.”

This closing statement might be a bit grandiose for some journals—I’m not even sure what it means—but if your study is carefully executed and conservatively interpreted, most editors will permit you to indulge yourself a bit at the two broad ends of the hourglass. Being dull only appears to be a prerequisite for publishing in the professional journals.

The Introduction

The Opening Statements. The first task of the article is to introduce the background and nature of the problem being investigated. Here are four rules of thumb for your opening statements:

1. Write in English prose, not psychological jargon.
2. Do not plunge unprepared readers into the middle of your problem or theory. Take the time and space necessary to lead them up to the formal or theoretical statement of the problem step by step.
3. Use examples to illustrate theoretical points or to introduce unfamiliar conceptual or technical terms. The more abstract the material, the more important such examples become.
4. Whenever possible, try to open with a statement about people (or animals), not psychologists or their research (This rule is almost always violated. Don't use journals as a model here.)

Examples of Opening Statements:

Wrong: Several years ago, Ekman (1972), Izard (1977), Tomkins (1980), and Zajonc (1980) pointed to psychology's neglect of the affects and their expression. [Okay for somewhere in the introduction, but not the opening statement.]

Right: Individuals differ radically from one another in the degree to which they are willing and able to express their emotions.

Wrong: Research in the forced-compliance paradigm has focused on the effects of predecisional alternatives and incentive magnitude.

Wrong: Festinger's theory of cognitive dissonance received a great deal of attention during the latter part of the twentieth century.

Right: The individual who holds two beliefs that are inconsistent with one another may feel uncomfortable. For example, the person who knows that he or she enjoys smoking but believes it to be unhealthy may experience discomfort arising from the inconsistency or disharmony between these two thoughts or cognitions. This feeling of discomfort was called *cognitive dissonance* by social psychologist Leon Festinger (1957), who suggested that individuals will be motivated to remove this dissonance in whatever way they can.

Note how this last example leads the reader from familiar terms (*beliefs, inconsistency, discomfort, thoughts*) through transition terms (*disharmony, cognitions*) to the unfamiliar technical term *cognitive dissonance*, thereby providing an explicit, if nontechnical, definition of it. The following example illustrates how one might define a technical term (*ego control*) and identify its conceptual status (a personality variable) more implicitly:

The need to delay gratification, control impulses, and modulate emotional expression is the earliest and most ubiquitous demand that society places upon the developing child. And because success at so many of life's tasks depends critically upon the individual's mastery of such ego control, evidence for life-course continuities in this central personality domain should be readily obtained.

And finally, here is an example in which the technical terms are defined only by the context. Note, however, that the technical abbreviation, *MAO*, is still identified explicitly when it is first introduced.

In the continuing search for the biological correlates of psychiatric disorder, blood platelets are now a prime target of investigation. In particular, reduced monoamine oxidase (MAO) activity in the platelets is sometimes correlated with paranoid symptomatology, auditory hallucinations or delusions in chronic schizophrenia, and a tendency towards psychopathology in non-clinical samples of men. Unfortunately, these observations have not always replicated, casting doubt on the hypothesis that MAO activity is, in fact, a biological marker in psychiatric disorder. Even the general utility of the platelet model as a key to central nervous system abnormalities in schizophrenia remains controversial. The present study attempts to clarify the relation of MAO activity to symptomatology in chronic schizophrenia.

This kind of writing would not appear in *Newsweek*, and yet it is still comprehensible to an intelligent layperson who may know nothing about blood platelets, MAO activity, or biological markers. The structure of the writing itself adequately defines the relationships among these things and provides enough context to make the basic idea of the study and its rationale clear. At the same time, this introduction is not condescending nor will it bore the technically sophisticated reader. The peda-

gogy that makes this introduction accessible to the nonspecialist will not only be transparent to the specialist, but will enhance the clarity of the article for both readers.

Examples of Examples. When developing complex conceptual arguments or introducing technical materials, it is important not only to provide your readers with illustrative examples, but to select the examples with care. In particular, you should try to compose one or two examples that anticipate your actual findings and then use them recurrently to make several inter-related conceptual points. For example, in one of my own studies of trait consistency, some participants were consistently friendly but not consistently conscientious (Bem & Allen, 1974). Accordingly, we used examples of friendliness and conscientiousness throughout the introduction to clarify and illustrate our theoretical points about the subtleties of trait consistency. This pedagogical technique strengthens the thematic coherence of an article and silently prepares the reader for understanding the results. It also shortens the article by removing the need to explain the theory once in the introduction with hypothetical examples and then again in the context of the actual results.

This article you are now reading itself provides examples of recurring examples. Although you do not know it yet, the major example will be the fictitious study of sex differences in emotional expression introduced earlier to illustrate the hour-glass shape of an article. I deliberately constructed the study and provided a sufficient overview of it at the beginning so that I could draw upon it throughout the article. Watch for its elaboration as we proceed. I chose dissonance theory as a second example because most psychologists are already familiar with it; I can draw upon this shared resource without having to expend a lot of space explaining it. But just in case you are not familiar with it, I introduced it first in the context of “examples of opening statements” where I could bring you in from the beginning—just as you should do with your own readers. And finally, the Bem-Allen article on trait consistency, mentioned in the previous paragraph, has some special attributes that will earn it additional cameo appearances as we continue.

The Literature Review. After making the opening statements, summarize the current state of knowledge in the area of investigation. What previous research has been done on the problem? What are the pertinent theories of the phenomenon? Although you will have familiarized yourself with the literature before you designed your own study, you may need to look up additional references if your results raise a new aspect of the problem or lead you to recast the study in a different framework. For example, if you discover an unanticipated sex difference in your data, you will want to determine if others have reported a similar sex difference or findings that might explain it. If you consider this finding important, discuss sex differences and the pertinent literature in the introduction. If you consider it to be only a peripheral finding, then postpone a discussion of sex differences until the discussion section.

The *Publication Manual* gives the following guidelines for the literature review:

Discuss the literature but do not include an exhaustive historical review. Assume that the reader is knowledgeable about the field for which you are writing and does not require a complete digest. . . . [C]ite and reference only works pertinent to the specific issue and not works of only tangential or general significance. If you summarize earlier works, avoid nonessential details; instead, emphasize pertinent findings, relevant methodological issues, and major conclusions. Refer the reader to general surveys or reviews of the topic if they are available. (APA, 2001, p. 16)

The *Publication Manual* also urges authors not to let the goal of brevity mislead them into writing a statement intelligible only to the specialist. One technique for describing even an entire study succinctly without sacrificing clarity is to describe one variation of the procedure in chronological sequence, letting it convey the overview of the study at the same time. (You can use the same technique in your own method section.) Here, for example, is a possible summary of a complicated but classic experiment on cognitive dissonance theory (Festinger & Carlsmith, 1959):

Sixty male undergraduates were randomly assigned to one of three conditions. In the \$1 condition, the participant was first required to perform long repetitive laboratory tasks in an individual experimental session. He was then hired by the experimenter as an “assistant” and paid \$1 to tell a waiting fellow student (a confederate) that the tasks were fun and interesting. In the \$20 condition, each participant was hired for \$20 to do the same thing. In the control condition, participants simply engaged in the tasks. After the experiment, each participant indicated on a questionnaire how much he had enjoyed the tasks. The results showed that \$1 participants rated the tasks as significantly more enjoyable than did the \$20 participants, who, in turn, did not differ from the control participants.

This kind of condensed writing looks easy. It is not, and you will have to rewrite such summaries repeatedly before they are both clear and succinct. The preceding paragraph was my eighth draft.

Citations. The standard journal format permits you to cite authors in the text either by enclosing their last names and the year of publication in parentheses, as in A below, or by using their names in the sentence itself, as in B.

- A. "MAO activity in some individuals with schizophrenia is actually higher than normal (Tse & Tung, 1949)."
- B. "Tse and Tung (1949) report that MAO activity in some individuals with schizophrenia is actually higher than normal."

In general, you should use form A, consigning your colleagues to parentheses. Your narrative line should be about MAO activity in individuals with schizophrenia, not about Tse and Tung. Occasionally, however, you might want the focus specifically on the authors or researchers: "Theophrastus (280 B.C.) implies that persons are consistent across situations, but Montaigne (1580) insists that they are not. Only Mischel (1968), Peterson (1968), and Vernon (1964), however, have actually surveyed the evidence in detail." The point here is that you have a deliberate choice to make. Don't just intermix the two formats randomly, paying no attention to the narrative structure.

Criticizing Previous Work. If you take a dim view of previous research or earlier articles in the domain you reviewed, feel free to criticize and complain as strongly as you feel is commensurate with the incompetence you have uncovered. But criticize the work, not the investigators or authors. Ad hominem attacks offend editors and reviewers; moreover, the person you attack is likely to be asked to serve as one of the reviewers of your article. As a consequence, your opportunity to address—let alone, offend—readers will be nipped in the bud. I could launch into a sermonette on communitarian values in science, but I shall assume that this pragmatic warning is sufficient.

Ending the Introduction. End the introduction with a brief overview of your own study. This provides a smooth transition into the method section, which follows immediately:

Because this sex difference remains elusive, it seemed desirable to test Zanna's parental-role theory of emotional expression in a more realistic setting. Accordingly, in the study to be presented here, we exposed men and women to filmed scenes designed to evoke either negative or positive emotions and assessed their emotional reactions when they thought they were being observed by one or both of their parents. We also sought to examine the relation of emotional expression to self-esteem.

The Method Section

The *Publication Manual* spells out in detail what needs to be included in the method section of an article. Here are some additional stylistic suggestions.

If you conducted a fairly complex experiment in which there was a sequence of procedures or events, it is helpful to lead the reader through the sequence as if he or she were a participant. First give the usual overview of the study, including the description of participants, setting, and variables assessed, but then describe the experiment from the participant's vantage point. Provide summaries or excerpts of what was actually said to the participant, including any rationale or "cover story" that was given. Describe the relevant aspects of the room. Show sample items from questionnaires, labels on attitude scales, copies of stimulus materials or pictures of apparatus. If you administered a standard personality test or attitude scale, describe its general properties unless it is very familiar (e.g., the MMPI or the F scale). For example: "Participants then filled out the Marlowe-Crowne Social Desirability Scale, a true-false inventory that measures the degree to which persons describe themselves in socially desirable terms (e.g., 'I have never lied')."

The purpose of all this is to give your readers a feel for what it was like to be a participant. (This is true even if you used non-human participants. Thus it is more important to describe the schedule of reinforcement and the inner dimensions of the Skinner Box—what the animal actually experienced—then its outer dimensions and the voltage of the power supply.) Such information often bears importantly on the interpretation of the behavior observed, and readers should be in a position to arrive at their own judgments about your conclusions.

Name all groups, variables, and operations with easily recognized and remembered labels. Do not use abbreviations (the AMT5% group) or empty labels (Treatment 3). Instead, tell us about the success group and the failure group, the father-watching condition and the mother-watching condition, the teacher sample and the student sample, and so forth. It is also better to label groups or treatments in operational rather than theoretical terms. It is difficult to remember that it was the high dissonance group that was offered the small incentive and the low dissonance group that was offered the large incentive. So tell us instead about the \$1 group and the \$20 group. You can remind us of the theoretical interpretation of these variables later when you discuss the results.

The method and results sections share the responsibility for presenting certain kinds of data that support the reliability and validity of your substantive findings, and you must judge where this information fits most smoothly into the narrative and when the reader can most easily assimilate it. For example, if you constructed a new personality scale, you need to tell us about its internal homogeneity and other psychometric properties. If you employed observers, tell us about interjudge agree-

ment. If you mailed survey questionnaires, give us the return rate and discuss the possibility that non-respondents differed from respondents. If you discarded certain participants, tell us why and how many and discuss the possibility that this limits or qualifies the conclusions you can draw. In particular, assure us that they were not all concentrated in the same experimental condition. (Participants discarded during data analysis should be discussed in the results section.)

Discuss participant dropout problems and other difficulties encountered in executing the study only if they might affect the validity or the interpretation of your results. Otherwise spare us your tales of woe. Do tell us that some participants fled your high-stress treatment before you could assess their physiological response, but do not tell us that your dog ate your pigeon and you had to redo the experiment or that you couldn't run participants Tuesday night because the custodian inadvertently locked the building.

Manipulations and procedures that yielded no useful information should be mentioned if they were administered before you collected your main data; their presence could have affected your findings. Usually it will be sufficient to say that they yielded no information and will not be discussed further. You probably do not need to mention them at all if they were administered after you collected your main data unless you think that other investigators might try to pursue the same fruitless path. Sometimes, however, a "null" result is surprising or of interest in its own right. In this case, it should be treated as a regular datum in your results section.

After presenting the methods you used in your study, discuss any ethical issues they might raise. If the research design required you to keep participants uninformed or even misinformed about the procedures, how did you tell them about this afterwards? How did you obtain their prior consent? Were they free to withdraw at any time? Were they subjected to any embarrassment or discomfort? What steps were followed to protect their anonymity? Were you observing people who were unaware of that fact?

If your study raises any of these issues, you should be prepared to justify your procedures. Moreover, you need to assure us that your participants were treated with dignity and that they left your study with their self-esteem intact and their respect for you and psychology enhanced rather than diminished. If you used non-human participants—especially dogs, cats, or primates—then you need to address analogous questions about their care and treatment.

End the method section with a brief summary of the procedure and its overall purpose. Your grandmother should be able to skim the method section without reading it; the final paragraph should bring her back "on line."

The Results Section

In short articles or reports of single empirical studies, the results and discussion are often combined. But if you need to integrate several different kinds of results or discuss several general matters, then prepare a separate discussion section. There is, however, no such thing as a pure results section without an accompanying narrative. You cannot just throw numbers at readers and expect them to retain them in memory until they reach the discussion. In other words, write the results section in English prose.

Setting the Stage. Before you can present your results, there are two preliminary matters that need to be handled. First, you should present evidence that your study successfully set up the conditions for testing your hypotheses or answering your questions. If your study required you to produce one group of participants in a happy mood and another in a depressed mood, show us in this section that mood ratings made by the two groups were significantly different. If you divided your participants into groups, assure us that these groups did not differ on some unintended variable that might bear upon the interpretation of your results (e.g., social class, intelligence). If your study required you to misinform participants about the procedures, how do you know that they were not suspicious, that participants who participated earlier had not informed participants who participated later, and that your "cover story" produced the state of belief required for the test of your hypotheses?

Here is also where you can put some of the data discussed in "The Method Section": Reliabilities of testing instruments, judges, and observers; return rates on mail surveys; and participant dropout problems.

Not all of these matters need to be discussed at the beginning of the results section. In addition to data you think fit better in the method section, some of these other matters might better be postponed until the discussion section when you are considering alternative explanations of your results (e.g., the possibility that some participants became suspicious). Again, the decision of what to include is very much a matter of judgment. It is an important step, but do not overdo it. Get it out of the way as quickly as possible and get on with your story.

The second preliminary matter to deal with is the method of data analysis. First, describe any overall procedures you used to convert your raw observations into analyzable data. How were responses to your mail survey coded for analysis?

How were observers' ratings combined? Were all measures first converted to standard scores? Some of these may also fit better into the method section and need not be repeated. Similarly, data-combining procedures that are highly specific can be postponed. If you combined three measures of anxiety into a single composite score for analysis, tell us about that later when you are about to present the anxiety data.

Next, tell us about the statistical analysis itself. If this is standard, describe it briefly (e.g., "All data were analyzed by two-way analyses of variance with sex of participant and mood induction as the independent variables"). If the analysis is unconventional or makes certain statistical assumptions your data might not satisfy, however, discuss the rationale for it, perhaps citing a reference for readers who wish to check into it further. If your method of analysis is new or likely to be unfamiliar to readers of the journal, you might need to provide a full explanation of it. Sometimes the quantitative treatment of data is a major part of an article's contribution. Variations of multidimensional scaling, causal modeling, and circumplex representations of personality data, for example, have been more important in some articles than the data to which they were applied. In these cases, the method of analysis and its rationale have the same epistemological status as a theory and should be presented in the introduction to the article.

And finally, if the results section is complicated or divided into several parts, you may wish to provide an overview of the section: "The results are presented in three parts. The first section presents the behavioral results for the men, followed by the parallel results for the women. The final section presents the attitudinal and physiological data for both sexes combined." But as I shall argue, this kind of "metacommentary" should be used sparingly. In most cases, the prose itself should make it unnecessary.

Presenting the Findings. The general rule in reporting your findings is to give the forest first and then the trees. This is true of the results section as a whole: Begin with the central findings, and then move to more peripheral ones. It is also true within subsections: State the basic finding first, and then elaborate or qualify it as necessary. Similarly, discuss an overall measure of aggression or whatever first, and then move to its individual components. Beginning with one of your most central results, proceed as follows:

1. Remind us of the conceptual hypothesis or the question you are asking: "It will be recalled that the men are expected to be more emotionally expressive than the women." Or, "We ask, first, whether the men or the women are more emotionally expressive?" Note that this is a conceptual statement of the hypothesis or question.

2. Remind us of the operations performed and behaviors measured: "In particular, the men should produce more tears during the showing of the film than the women." Or, "Do the men produce more tears during the showing of the film than the women?" Note that this is an operational statement of the hypothesis or question.

3. Tell us the answer immediately and in English: "The answer is yes." Or, "As Table 1 reveals, men do, in fact, cry more profusely than the women."

4. Now, and only now, speak to us in numbers. (Your grandmother can now skip to the next result in case she has forgotten her statistics or her reading glasses.): "Thus the men in all four conditions produced an average of 1.4 cc more tears than the women, $F(1,112) = 5.79, p < .025$."

5. Now you may elaborate or qualify the overall conclusion if necessary: "Only in the father-watching condition did the men fail to produce more tears than the women, but a specific test of this effect failed to reach significance, $t = 1.58, p < .12$."

6. End each section of the results with a summary of where things stand: "Thus, except for the father-watching condition, which will be discussed below, the hypothesis that men cry more than women in response to visually-depicted grief appears to receive strong support."

7. Lead into the next section of the results with a smooth transition sentence: "Men may thus be more expressive than women in the domain of negative emotion, but are they more expressive in the domain of positive emotion? Table 2 shows they are not..." (Again, the "bottom line" is given immediately.) As the results section proceeds, continue to summarize and "update" the reader's store of information frequently. The reader should not have to keep looking back to retrieve the major points of your plot line.

By structuring the results section in this way, by moving from forest to trees, by announcing each result clearly in prose before wading into numbers and statistics, and by summarizing frequently, you permit a reader to decide just how much detail he or she wants to pursue at each juncture and to skip ahead to the next main point whenever that seems desirable.

Figures and Tables. Unless a set of findings can be stated in one or two numbers, results that are sufficiently important to be stressed should be accompanied by a figure or table summarizing the relevant data. The basic rule of presentation is that a reader be able to grasp your major findings either by reading the text or by looking at the figures and tables. Thus, figures and tables must be titled and labeled clearly and completely, even if that means constructing a lengthy title or heading (“Mean number of tears produced by two affective films as a function of affect valence, participant sex, parental observation, and self-esteem”). Within the text itself, lead the reader by the hand through a table to point out the results of interest: “As shown in the first column of Table 2, men produce more tears (2.33 cc) than women (1.89 cc)... Of particular interest is the number of tears produced when both father and mother watch (rows 3 and 4)...” Do not just wave in the general direction of the table and expect the reader to ferret out the information. For detailed information on figures and tables, see the *Publication Manual* (APA, 2001).

On Statistics. As you know, every comparison between groups or relationship between variables should be accompanied by its level of statistical significance. Otherwise, readers have no way of knowing whether the findings could have emerged by chance. But despite the importance of inferential statistics, they are not the heart of your narrative and should be subordinated to the descriptive results. Whenever possible, state a result first and then give its statistical significance, but in no case should you ever give the statistical test alone without interpreting it substantively. Do not tell us that the three-way interaction with sex, parent condition, and self-esteem was significant at the .05 level unless you tell us immediately and in English that men are less expressive than women in the negative conditions if father watches—but only for men with low self-esteem.

If your experiment used an analysis of variance design, your data analysis will automatically display the effects of several independent variables on a single dependent variable. If this organization is consonant with a smooth presentation of your results, lucky you. Go with it. But do not be a prisoner of ANOVA! If the narrative flows more smoothly by discussing the effects of a single independent variable on several conceptually related dependent variables, tear your ANOVA results apart and reorganize them. Statistical designs are all right in their place, but you—and your prose—are master; they are slave.

Just as your method section should give readers a feel for the procedures used, so too, the results section should give them a feel for the behavior observed. Select descriptive indexes or statistics that convey the behavior of your participants as vividly as possible. Tell us the percent of children in your study who hit the Bobo doll or the mean number of times they did so. Remind us that a score of 3.41 on your 5-point rating scale of aggression lies between “slightly aggressive” and “moderately aggressive.”

Do this even if the statistical analyses must be performed on some more indirect datum (e.g., the arcsin transform of the number of Bobo hits or the sum of three standardized aggression scores.) Display these indirect indexes, too, if you wish, but give the readers’ intuitions first priority. For example, in our study of trait consistency, we analyzed a standard-score index of individual consistency, but we discussed the results in terms of the more familiar correlation coefficient—on which no legitimate statistical analysis could be performed (Bem & Allen, 1974).

After you have presented your quantitative results, it is often useful to become more informal and briefly to describe the behavior of particular individuals in your study. Again, the point is not to prove something, but to add richness to your findings, to share with readers the feel of the behavior: “Indeed, two of the men used an entire box of Kleenex during the showing of the heart operation but would not pet the baby kitten owned by the secretary.”

The Discussion Section

As noted earlier, the discussion section can either be combined with the results section or appear separately. In either case, it forms a cohesive narrative with the introduction, and you should expect to move materials back and forth between these two sections as you rewrite and reshape the report. Topics that are central to your story will appear in the introduction and probably again in the discussion. More peripheral topics may not be brought up at all until after the presentation of the results. The discussion is also the bottom of the hourglass-shaped format and thus proceeds from specific matters about your study to more general concerns (about methodological strategies, for example) to the broadest generalizations you wish to make. The sequence of topics is often the mirror image of the sequence in the introduction.

Begin the discussion by telling us what you have learned from the study. Open with a clear statement on the support or nonsupport of the hypotheses or the answers to the questions you first raised in the introduction. But do not simply reformulate and repeat points already summarized in the results section. Each new statement should contribute something new to the reader’s understanding of the problem. What inferences can be drawn from the findings? These inferences may be at a level quite close to the data or may involve considerable abstraction, perhaps to the level of a larger theory regarding, say, emotion or sex differences. What are the theoretical, practical, or even the political implications of the results?

It is also appropriate at this point to compare your results with those reported by other investigators and to discuss possible shortcomings of your study, conditions that might limit the extent of legitimate generalization or otherwise qualify your inferences. Remind readers of the characteristics of your participant sample, the possibility that it might differ from other populations to which you might want to generalize; of specific characteristics of your methods that might have influenced the outcome; or of any other factors that might have operated to produce atypical results.

But do not dwell compulsively on every flaw! In particular, be willing to accept negative or unexpected results without a tortured attempt to explain them away. Do not make up long, involved, pretzel-shaped theories to account for every hiccup in the data. There is a $-.73$ correlation between the clarity of an investigator's results and the length of his or her discussion section. Do not contribute to this shameful statistic.

Ah, but suppose that, on the contrary, your results have led you to a grand new theory that injects startling clarity into your data and revolutionizes your view of the problem area. Doesn't this justify a long discussion section? No. In this case, you should write the article so that you begin with your new theory. As noted above, your task is to provide the most informative and compelling framework for your study from the opening sentence. If your new theory does that, don't wait until the discussion section to spring it on us. A journal article is not a chronology of your thought processes.

The discussion section also includes a consideration of questions that remain unanswered or that have been raised by the study itself, along with suggestions for the kinds of research that would help to answer them. In fact, suggesting additional research is probably the most common way of ending a research report.

Common, but dull. The hourglass shape of an article implies that your final words should be broad general statements of near-cosmic significance, not precious details of interest only to psychologists. Thus the statement, "Further research will be needed before it is clear whether the androgyny scale should be scored as a single continuous dimension or partitioned into a 4-way typology," might well be appropriate somewhere in a discussion section, but, please, not your final farewell. In my opinion, only Montaigne was clever enough to end an article with a statement about further research: "Because [the study of motivation] is a high and hazardous undertaking, I wish fewer people would meddle with it" (1580/1943).

You should probably settle for more modest injunctions: "If gender schema theory has a political message, it is... that... human behaviors and personality attributes should no longer be linked with gender, and society should stop projecting gender into situations irrelevant to genitalia. The feminist prescription, then, is not that the individual be androgynous, but that the society be gender-aschematic" (S. Bem, 1985).

But in any case, end with a bang, not a whimper.

The Title and Abstract

The title and abstract of your article permit potential readers to get a quick overview of your study and to decide if they wish to read the article itself. Titles and abstracts are also indexed and compiled in reference works and computerized databases. For this reason they should accurately reflect the content of the article and include key words that will ensure their retrieval from a database. You should compose the title and abstract after you have completed the article and have a firm view of its structure and content.

The recommended length for a title is 10 to 12 words. It should be fully explanatory when standing alone and identify the theoretical issues or the variables under investigation. Because you will not be able to mention all the features of your study in the title (or even in the abstract), you must decide which are most important. Once again, the data should guide you. For example, the most instructive findings from our fictitious study on emotional expression should determine which of the following is the most appropriate title: "Laughing versus Crying: Sex Differences in the Public Display of Positive and Negative Emotions"; "Effects of Being Observed by Parents on the Emotional Responses of Men and Women to Visual Stimuli"; "Emotional Responses to Visual Stimuli as a Function of Sex and Self-Esteem"; "Sex Differences in the Public Display of Emotion as a Function of the Observing Audience"; "Public versus Private Displays of Emotion in Men and Women."

The abstract of an empirical article should not exceed 120 words. It should contain the problem under investigation (in one sentence if possible); the participants, specifying pertinent characteristics, such as number, type, age, sex, and species; the experimental method, including the apparatus, data-gathering procedures, and complete test names; the findings, including statistical significance levels; and the conclusion and the implications or applications.

Clearly the abstract must be compact, and this requirement leads many inexperienced writers to make it unintelligible. Remove unnecessary words and eliminate less important details of method and results. But then let it breathe. In particular,

allow yourself the space to make the problem under investigation clear to a casually browsing reader. Often you can plagiarize and abbreviate key statements from the article itself. Here is an example:

When are men more emotionally expressive than women? One hundred male and 100 female undergraduates were individually shown a sad or a happy film, while being observed by one or both of their parents. Judges blind to condition rated participants' facial expressions, and a Lachrymeter measured their tear volume. Men cried more during the sad movie but laughed less during the happy movie than did the women (interaction, $p < .02$). However, men in the father-watching condition with low self-esteem (Darley Self-Concept Scale) cried less than all other participants ($p < .05$). It is suggested that sex differences in emotional expression are moderated by the valence of the emotion and—for men—by self-esteem and conditions of being observed.

If the conceptual contribution of your article is more important than the supporting study, this can be reflected in the abstract by omitting experimental details and giving more space to the theoretical material. Here is the title and abstract from our *Psychological Review* article on trait consistency (revised to conform to the new 100 word limit on abstracts of reviews and theoretical articles):

On Predicting Some of the People Some of the Time: The Search for Cross-Situational Consistencies in Behavior

The recurring controversy over the existence of cross-situational consistencies in behavior is sustained by the discrepancy between our intuitions, which affirm their existence, and the research literature, which does not. It is argued that the nomothetic assumptions of the traditional research paradigm are incorrect and that higher validity coefficients would be obtained if the idiographic assumptions used by our intuitions were adopted. A study is reported which shows it is possible to predict who will be cross-situationally consistent and who will not. Personality assessment must not only attend to situations—as has been recently urged—but to persons as well (Bem & Allen, 1974).

Rewriting and Polishing Your Article

For many authors revising an article is unmitigated agony. Even proofreading is painful. And so they don't. So relieved to get a draft done, they send it off to the journal thinking that they can clean up the writing after it has been accepted. Alas, that day rarely comes. Some may find solace in the belief that the manuscript probably would have been rejected even if it had been extensively revised and polished; after all, most of psychology journals accept only 15 to 20% of all manuscripts submitted. But from my experience as an editor, I believe that the difference between the manuscripts accepted and the top 15 to 20% of those rejected is frequently the difference between good and less good writing. Moral: Do not expect journal reviewers to discern your brilliance through the smog of polluted writing. Revise your manuscript. Polish it. Proofread it. Then submit it.

Rewriting is difficult for several reasons. First, it is difficult to edit your own writing. You will not notice ambiguities and explanatory gaps because you know what you meant to say and you understand the omitted steps. One strategy for overcoming this difficulty is to lay your manuscript aside for awhile and then return to it later when it has become less familiar. Sometimes it helps to read it aloud. But there is no substitute for practicing the art of taking the role of the nonspecialist reader, for learning to role-play grandma. As you read, ask yourself, "Have I been told yet what this concept means?" "Has the logic of this step been demonstrated?" "Would I know what the independent variable is at this point?" This is precisely the skill of the good lecturer in Psychology 101, the ability to anticipate the audience's level of understanding at each point in the presentation. Good writing is good teaching.

But because this is not easy, you should probably give a fairly polished copy of the manuscript to a friend or colleague for a critical review. (If you get a critique from two colleagues you will have simulated a trial run of a journal's review process.) The best readers are those who have themselves published in the psychological journals, but who are unfamiliar with the subject of your article. (A student from Psychology 101 would probably be too intimidated to give usefully critical feedback; grandma will be too kind.)

If your colleagues find something unclear, do not argue with them. They are right: By definition, the writing is unclear. Their suggestions for correcting the unclarity may be wrong, even dumb. But as unclarity detectors, readers are never wrong. Also resist the temptation simply to clarify their confusion verbally. Your colleagues do not want to offend you or appear stupid, and so they will simply mumble "oh yes, of course, of course" and apologize for not having read carefully enough. As a consequence, you will be pacified, and your next readers, the journal reviewers, will stumble over the same problem. They will not apologize; they will reject.

Don't need to read unless you want to