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13 COMMUNICATING RESEARCH

It may seem strange that so many exceedingly intelligent persons are wholeheartedly devoted to a profession in which the main goal is to come up with creations with which their colleagues try to find fault. At the same time, you may understand why great minds find this endeavour fascinatingly challenging—to wrestle from nature her secrets and formulate them in such simple and comprehensible language that they are indisputable. William Garvey

At this point, you probably have completed your study and are ready to write the report of your research. Unfortunately, many students don't look forward to this task, viewing it only as difficult busywork. If this is your experience, try thinking of the writing as an opportunity to rethink your project. Many researchers find that communicating their work to others helps them to develop a new perspective on it, a better understanding of how it fits with past research, and a clearer sense of its implications. Sometimes new ideas for research emerge in the process.

In this phase of your work, you move from being a researcher in the cycle of discovery, to becoming a contributing member of the scientific community in the cycle of validation. In writing your report, you become part of a noble tradition, which Albert Einstein described as the most objective thing known to humankind. As we shall see, science as a community of scholars sharing discoveries and evaluating each other's work developed only a few hundred years ago. Yet in that short time, it has altered our understanding of the world and greatly enhanced the quality of our lives.

On November 28, 1660, a small group of British scientists and thinkers came together to establish the Royal Society of London for the Promotion of Natural Knowledge, or, more simply, the Royal Society. This band of revolutionaries had met many times before as the "Invisible College" (see Chapter 1), a group dedicated to rejecting knowledge based on authority and trusting "only the perpetually repeated observations of our own eyes and the careful weighings of our scales, . . . the answers experiments give us and no other answers!" (de Kruif, 1926/1954, p. 7). When political changes in Britain made secrecy unnecessary, its members asked the new king, Charles II, to formally recognize their group. He did so in 1662, creating the first officially sanctioned scientific society in the English-speaking world.

The Royal Society's members wanted to make their pronouncements on scientific matters indisputable. Their method for doing so was to make scientists a community, one bound together by common rules of operation and by the exchange of scientific information—by communication. Henceforth, scientists were to keep the potential judgments of their peers in mind as they planned and carried out experiments; they were to "carry the eyes, and the imaginations of the whole company into the *Laboratory* with them" (Sprat, 1667/1958, p. 99). Once the research was complete, they were to report back to the group, demonstrating their methods and findings to them. For their part, the group would subject the scientist's claims to "critical, and reiterated scrutiny" (Sprat, 1667/1958 p. 99), pronouncing them demonstrated or not demonstrated. To be accepted as science, knowledge would have to be public and demonstrable. Seeing would be believing.

Another challenge was to make science progressive, especially in an age when knowledge was increasing at an unprecedented rate. The invention of the microscope and telescope had revealed unknown new worlds yet to be charted. Explorers visiting the New World had returned with previously unseen plant and animal species. How could the scientists of the Royal Society keep up with such discoveries? How could the public validation that had become the guiding credo of this new scientific community be assured?

Henry Oldenbourg, then secretary of the Royal Society, was put in charge of setting the agendas for the group's meetings. Oldenbourg decided to write to scientists all over England and Europe asking them about their work; he then translated their replies into Latin, English, and French, the languages that would allow the society's members to read them. In 1665, Oldenbourg started publishing the letters under the title *Philosophical Transactions: Giving some Accompt [Account] of the Present Understandings, Studies, and Labours, of the Ingenious in many Considerable Parts of the World*. Oldenbourg had created the first scientific journal published in the English language (Roediger, 1987).

Before journals became popular, scientists published their research in books or individual pamphlets. But relying on books delayed the spread of knowledge because researchers had to accumulate enough findings to fill them before they could be published. Books also were expensive, so few people could afford them. Journals, by contrast, proved to be an efficient and timely way to disseminate the results of research, including single experiments and studies.

Despite the advantages of publishing in journals, at first few scientists submitted research reports to them, fearing that other scientists might claim their discoveries as their own. To quell such fears, when editors published reports they began to include the date on which they received them, giving scientists a means to establish the priority of their discoveries. Modern scientific journals have continued this practice for the same reason.

Because editors received few research reports in the early years, most were accepted uncritically, even when the findings they reported would strike most readers as fantastic. Roediger, for example, reports:

In an early German journal, the *Miscellanea Curiosa*, an author wrote of a woman who vomited toads and another who vomited kittens. A different paper reported women who gave birth to animals of various sorts, including mice, frogs, crabs, and snakes. (Roediger, 1987, p. 226)

Because such reports damaged the credibility of science and its practitioners, *Philosophical Transactions* began to distinguish between papers that had been reviewed and approved and those that had not (Roediger, 1987). This practice evolved into modern peer review of scientific papers prior to publication. In this process, the editor of a journal, a recognized expert in the field, reads submitted papers to decide whether they warrant further review. If the decision is positive, two or more researchers are selected from among those working in the area covered by the paper to review it. These reviewers, along with the editor, exercise quality control over what is published in the journal. They look at whether the work contributes to

scientific knowledge, addresses important problems, uses appropriate methods, and leads to sound conclusions.

As editors and reviewers began to function as gatekeepers for journals, their reputation and numbers grew rapidly. Today the journal is the prime vehicle for communicating research in psychology and other scientific disciplines, and the more thorough the peer review, the greater the journal's reputation and the esteem that comes from publishing in it.

Given the short history of psychology compared to other sciences, it is not surprising that psychology's first journal was published two centuries after *Philosophical Transactions* began. Alexander Bain, a 19th-century philosopher, a free-lance journalist, and a friend of John Stuart Mill, founded the journal *Mind*, in 1876 (Hothersall, 1995). Charles Darwin, Francis Galton, and many other distinguished scientists published in it. Other psychology journals soon followed, and as of October, 2014, articles from 2,562 journals are reviewed each year in the *PsycINFO* database (see Chapter 11).

In Chapter 11, you learned how to use psychology journals as a source of information about research. In this chapter, we focus on how to write a research report in the style required for publishing in them. We also discuss the American Psychological Association's (APA's) ethical guidelines related to publishing, completing our discussion of the ethics of research. Let's begin by considering the goals of scientific writing and how the language of science helps to foster them.

13.1 THE LANGUAGE OF SCIENCE

The members of the Royal Society wanted to dissociate themselves from the pre-scientific chemistry of the alchemists who sought ways to convert base metals into gold and to find the elixir of life. The alchemists conducted their studies in secret and wrote about them in private languages of their own invention. Such practices violated the basic tenet of the new science that discoveries be shared with and evaluated by other scientists.

The Royal Society wanted to ensure that scientific reports would be understandable to any trained scientist who read them. Scientific writing had to be clear - clear enough so that readers could follow the logic that led to the hypotheses and procedures; clear enough so that readers could replicate the research, if they wished to, or mentally imagine its procedures in a kind of armchair mental replication; and clear enough so that interested readers could evaluate a report's conclusions. Scientific reports also had to be accurate. As we will discuss later in this chapter, accuracy is so fundamental to science that achieving it is considered to be a science writer's ethical responsibility.

In 1664, the society established a special committee for improving the English language. One of its members was Thomas Sprat, who later was commissioned by the society to write its history. One idea that the committee entertained, but rejected, was to create an artificial language that would be used by all scientists in reporting their research. The new language, once created, would enable its users to "describe precisely and exactly, without a trace of ambiguity, the object or concepts they wish to write about" (Walters, 1993, p. 241). Members of the Royal Society and others

attempted to create such a language, but none of these languages proved practical. (Otherwise you might have studied the universal language, instead of French or Spanish, in high school!)

The committee required the members of the Royal Society to be clear, plain, and accurate in their scientific writing; but it soon became evident that the language of science also would have to be concise. The letters from scientists that the Royal Society received in its early days often were long rambling reports that had to be edited extensively for publication in the journal. Accordingly, Thomas Sprat, the society's historian and spokesperson, called on scientists to be extremely brief in their scientific reports. As he put it, scientists should describe "so many things, almost in an equal number of words" (Sprat, 1667/1958, p. 249). Today space still is limited in scientific journals and so must be used efficiently. So the Royal Society's recommendation that scientists report their research as briefly as possible continues to be a convention in science to this day.

13.2 CONTENTS AND ORGANIZATION OF PSYCHOLOGICAL RESEARCH REPORTS

In this section, we present an overview of the contents and organization of a research report, based on the guidelines established by the APA (2010) in its 6th edition of the publication manual. This manual, which has been modified several times in the past, provides rules for researchers to follow in reporting their research. Like the rules of the Royal Society's special committee on language, these guidelines are intended to help researchers report clearly, accurately, and concisely on what they did in their research, why they did it, what they found, and the conclusions to draw from it.

We begin with an overview of the contents of an APA style research report (see Box 1), including, in order, the following sections: the Title Page, Abstract, Introduction, Method, Results, Discussion, References, Appendix (when needed), Author note, Footnotes, Tables, Figure captions, and Figures. Because writing conventions are difficult to understand in the abstract, in Appendix B we also reprint an article by Tiffany Field and her coworkers (Field et al., 1996). We refer to the contents of this paper repeatedly in our presentation. Because the article is reprinted as a manuscript, you also can use it as a model in arranging and writing your own paper.

BOX 1 ORGANIZATION AND CONTENT OF THE RESEARCH REPORT

!	□The pages in the report should be arranged in the following order and, except for the figures, numbered consecutively, each with a running head (see Box 9 for directions on numbering and the running head).	
!	The title page, abstract, introduction, references, and the subsequent sections all begin on a new page.	
	Title page	Includes the paper's title, author's name and institutional affiliation, and a running head.
	Abstract	A brief summary of the research report.
	Body of paper	Includes the four main sections of the paper: introduction, method, results, and discussion, in order.
	References	A list of all references used in the report, arranged in alphabetical order by the first author's surname.
	Appendix (optional)	Includes information too detailed or extensive to include in the body of the paper (e.g., questionnaires, large tables, instructions to participants, etc.).
	Author note	Includes author's present address and affiliation, if different from the one on the title page; address to request further information; financial support, if any; acknowledgment of contributions of others.
	Footnotes	Content footnotes supplement information in the text. They acknowledge permission to quote from copyrighted material.
	Tables	Labeled tables, each on a separate page, with notes.
	Figure captions	Label figures Figure 1, Figure 2, etc., each with an explanatory caption. List the captions directly below the figure.
	Figures	Put each figure on a separate sheet with the figure number written on the back. No page numbers.

13.2.1 Title Page

As Box 1 illustrates, the title page includes the title of the paper, author or authors' name(s) and institutional affiliation(s), and a running head. The running head is an abbreviated title, no more than 50 characters long, that appears at the top of each page of the *published* article and the manuscript).

Although the title should be brief—ten to twelve words in length—it also must be informative, fully explaining the main features of the study. A good title captures the central idea of the research "simply and, if possible, with style" (APA, 2010, p. 23). The title should convey the problem or theoretical issue being investigated as well as the study's key variables. The title of the Field et al. paper, "Massage therapy reduces anxiety and enhances EEG patterns of alertness and math computations," informs readers that the research examined the impact of massage therapy on anxiety and alertness, as measured by EEG (a physiological measure of brain arousal) and mathematical computations (a behavioral index of alertness).

Because there is so much research published, it is impossible for any scientist to read everything. So even dedicated psychologists must pick and choose which articles to read. The title must provide sufficient information so that readers can decide whether to read your abstract, which, in turn, must be complete and specific enough so that they know whether to read the complete report.

13.2.2 Abstract

Like the title, the abstract should accurately, completely, and concisely capture the essentials of the study. In 120 words (960 characters, including spaces) or less, the abstract informs readers of the problem investigated in the research, its method, results, conclusions, and implications. It makes sense to write the abstract after completing the full report, to ensure that it incorporates all necessary information. Because researchers today search the literature by computer, you also should take care to include key words in the abstract so that future computer searches using these terms will turn up your study.

As you read the Field et al. abstract, notice that although it fulfills all of the other requirements of an abstract, it exceeds the recommended word count. The added length was needed in this case because so many measures were used in the study. Because such exceptions to the APA style requirements are sometimes unavoidable, the manual advises authors to “balance the rules of the *Publication Manual* with good judgment” (APA, 2010, p. 5).

13.2.3 Introduction

The introduction begins on a new page, headed by the title of the paper, and is not otherwise labeled. Its purpose is to explain the nature of the research and why it was done. The introduction usually begins with a general statement of the research problem, reviews the literature, citing past research and theoretical papers on the problem, and ends with the specific questions or hypotheses that were tested in the study, along with the rationale for investigating them.

In writing the introduction, it is helpful to envision a particular sort of reader—one who is intelligent, well trained in psychology, but unfamiliar with the research tradition you are reporting. Your reader would know the language, general research techniques, and broad theoretical perspectives in the discipline, but would be unfamiliar with the specific problem under study or how past research is related to it.

13.2.3.1 *The research problem.*

The introduction begins by focusing on the general topic that the research addressed and explaining its importance. Was the study aimed at testing a theoretical idea, resolving a practical problem, or addressing a methodological issue? Why should the reader be interested in learning about it?

Because even seasoned writers have trouble coming up with the first few sentences of a paper, Box 2 gives some examples of "leads" for the introduction

BOX 2 LEADS FOR THE INTRODUCTION

Historical Roots of the Study's Focus

The Ayur-Veda, the earliest known medical text from India (around 1800 B.C.), lists massage along with diet and exercise as primary healing practices of that time. (Field, 1995, p. 105)

The National Institute of Mental Health (NIMH) (Rockville, MD) Treatment of Depression Collaborative Research Program was the first multisite coordinated study initiated by the NIMH in the field of psychotherapy. (Elkin et al., 1989 p. 971)

The Extent or Significance of a Practical Problem

Approximately 20,000 persons are murdered in the United States each year, making homicide the 11th leading cause of death and the 6th leading cause of the loss of potential years of life before age 65. (Sloan et al, 1988, p. 1256)

Pica, the ingestion of nonnutritive objects, is a specific form of self-injurious behavior that poses a significant health risk for a substantial number of persons with mental retardation. (Fisher et al, 1994, p. 447)

Statement of Major Idea That Will Be Extended, Amplified, Supported, or Challenged

One major advantage of living in a group is the opportunity provided to observe other group members find food. (Brown, 1986, p. 83)

Of the many kinds of tool-making and tool-using behaviors of chimpanzees, termite fishing is one of the most widely distributed behaviors. (Suzuki et al., 1995, p. 219)

Definition of the Major Concept

Tourette Syndrome (TS) is a neurological disorder that is hypothesized to be of organic etiology; it consists of multiple motor and vocal tics. (Azrin & Peterson, 1990, p. 305)

A sleeper effect in persuasion is a delayed increase in the impact of a persuasive message. The term was first used by Hovland, Lumsdaine, and Sheffield (1949) to describe opinion change produced by the U.S. Army's Why We Fight films used during World War II. (Pratkanis, Greenwald, Leippe, & Baumgardner, 1988, p. 203)

Statement of Current Theories or Beliefs

The most meaningful present-day theories of hypnosis interpret hypnotic phenomena along three major lines: (a) desire on the part of the subject to play the role of a hypnotized subject, (b) increase in suggestibility, and (c) a further less well-defined category that is called by White "an altered state of consciousness" and by others, "cortical inhibition," dissociation, etc. depending on their theoretical orientations. (Orne, 1959, p. 277)

A little more than 10 years ago, Gentner (1982) came up with a set of cognitive and perceptual factors to explain "Why Nouns Are Learned Before Verbs," or at least why they are the predominant category in children's early lexicons (Tardif, 1996, p. 492)

Case(s) Related to the Study's Purpose

Recent detailed accounts in the public media about the suicide of three highly talented and gifted individuals dramatically draw our attention to the role of intense perfectionism in suicidal behavior. (Blatt, 1995, p. 1003)

Methodological Issue Addressed

This study evaluates the validity of an innovative form of polygraph test, Reali's Positive Control Test, and compares it with a Control Question Test and a Guilty Knowledge Test in a laboratory model of field polygraph practice. (Forman & McCauley, 1987, p. 691)

taken from published research papers. As you can see, their contents include definitions of the major concept to be explored, statements about the historical roots of the study's focus, major ideas that will be extended, amplified, supported, or challenged, and practical, theoretical, or methodological issues that were addressed. Review these leads to see which type might work for your project. A good lead will help capture your readers' interest from the outset.

Field et al.'s lead would fit in the category "extent or significance of a practical problem." They began by pointing to the increasing popularity of stress-management programs in the workplace and the lack of research evaluating them. They also noted the almost exclusive reliance on reactive measures, like "professional opinions" and survey studies, in research assessing these programs. As we will see, their study used less reactive measures as well as self-report.

13.2.3.2 The literature review.

After stating the research problem, the introduction shifts to a review of the literature. This review sets the stage for presenting the study, by citing past research and theoretical papers related to it. In their report, Field et al. reviewed recent studies on the stress-reducing benefits of massage therapy on HIV-positive men and adolescents with psychiatric problems. They concluded that massage reduces anxiety

and depression, as measured by self-report, behavioral observations, salivary cortisol, norepinephrine levels, and enhanced immunity. They also reported that massage therapy was associated with increases in self-reported alertness in these studies and that research on the effects of *facial massage* has shown heightened alertness as measured by EEG, a physiological measure.

When referring to past publications in your literature review or elsewhere in the text of your paper, use the APA citation style. List the authors by their surnames only, separated by commas, followed by the year of publication in parentheses, as in the first example below. Use the same format for citing research or theoretical papers parenthetically, except that inside parentheses replace the word *and* with the symbol &, as in the second example. How to cite from a source depends on whether that source was in print or electronic form. Add the page number when quoting from a print source, as in the third example. If page numbers are not provided for electronic sources, use paragraph numbers, if visible, instead of page numbers. You can use the abbreviation para to designate which paragraph the quote is in. If paragraphs are not visible but sections are labeled, direct the reader to the section in which the quote is found.

Examples:

- (1) Suzuki, Kuroda, and Nishihara (1995) found that
- (2) Research done in the Ndoki forest (Suzuki, Kuroda, & Nishihara, 1995) discovered that
- (3) The authors concluded: "We may now be in a position to say that chimpanzees can change and use the environment to their advantage by the use of tools" (Suzuki, Kuroda, & Nishihara, 1995, p. 234).
- (4) As Myers (2000, para 5) aptly phrased it, "positive emotions are both an end – better to live fulfilled, with joy [and other positive emotions] — and a means to a more caring and healthy society." (APA, 2001, p. 120)
- (5) "The current system of managed care and the current approach to defining empirically supported treatments are shortsighted" (Beutler, 2000, Conclusion section, para 1) (APA, 2001, p. 120)

When a study has more than six authors, like the massage study, for example, cite only the first author's surname, followed by the Latin abbreviation *et al.* (meaning, *and others*) in place of the surnames of the remaining authors. Different rules for using *et al.* apply for citations following the first citation. Study Box 9, presented later in the chapter, for the specifics.

Because space is at a premium in journals, the literature review should be selective and logically ordered, presenting only those studies or theoretical papers that will help readers to better understand the research and why it was done. It should focus on similarities between the study and past research rather than on differences, as Murray Sidman, an experimental psychologist, explains:

As a young graduate student, . . . I felt that my work had to be different, that it had to produce something new that would startle the world. Along these lines I

once wrote a paper, describing some of my work, in which I emphasized how different my experiments were from anything else that had ever been done. One of my teachers, W. N. Schoenfeld, agreed that the data were very interesting. But he went on to add that I had written the paper from a peculiar point of view. I had emphasized the *differences* between my work and everyone else's. But science does not ordinarily advance that way. It is the job of science to find orderly relations among phenomena, not differences. It would have been more useful if I could have pointed out the similarities between my work and previous experiments. Although the task he set for me was not an easy one, I reached a new level of scientific maturity when I finally accepted his advice. (Sidman, 1960, p. 15)

13.2.3.3 *The rationale and design of the study.*

The literature review leads to the rationale for the research, that is, the reasons for doing it. The rationale explains how the study contributes to answering the general questions or resolving the theoretical, methodological, or practical concerns that were raised early in the introduction. The introduction ends with the specific purpose of the study and its overall design, preparing readers for the detailed presentation of methods that follows in the next section of the report.

Because rationales, like leads, can be difficult to write, Box 3 reprints several samples from published research studies. As you can see in Box 3, the possible rationales for research are diverse, including improving designs or measures, investigating untested theories or phenomena, discovering new facts and procedures, replicating and extending research, and evaluating theories, procedures and measures.

BOX 3 RATIONALES FOR THE INTRODUCTION

Improvements in Research Design or Measures

To date, no study has been able to separate the effects of handgun control from differences among populations in terms of socioeconomic status, aggressive behavior, violent crime, and other factors. (Sloan et al., 1988, p. 1256)

The purpose of the present study was to further evaluate the effectiveness of the habit reversal method in reducing the multiple motor and vocal tics of TS by using a larger number of subjects and a controlled between-subjects experimental design. (Azrin & Peterson, 1990, p. 307)

Theory or Phenomenon Previously Untested, or Studied under Limited Conditions

Although most research on chimpanzee hunting has focused on the factors surrounding hunting success, little attention has been paid to the decision to undertake a hunt when prey are encountered. (Stanford, Wallis, Mpongo, & Goodall, 1994, p. 3)

Previous studies with controlled designs have examined the behavior of children immediately after a dietary challenge, but these studies have been criticized for their brief duration and laboratory settings. (Wolraich et al., 1994, p. 301)

Discovery

In the research presented here, we sought to identify a set of successful operations for obtaining a sleeper effect. (Pratkanis et al., 1988, p. 205)

The purpose of the present study was to give an empirical answer to this question by determining the physiological conditions in which lucid dreaming occurs. (LaBerge, Nagel, Dement, & Zarcone, 1981, p. 727)

Replication and Extension of Research with New Subjects or Improved Measures

There is little research on children's early vocabulary development in Mandarin. (Tardif, 1996, p. 496)

In the above studies subjects anecdotally reported enhanced alertness instead of the expected soporific effect following massage. The purpose of the present study was to investigate the effects of massage on alertness as measured by EEG and by speed and accuracy of performance on math computations. The only massage study in the literature that recorded EEG showed that facial massage was accompanied by decreased alpha and beta, a pattern that is inconsistent with drowsiness. (Field et al., 1996, p. 198)

Evaluation of Theories, Procedures, and Measures

The study had two major aims: (1) to test the feasibility and value of the collaborative clinical trial model (a model frequently used in the field of psychopharmacology) in the area of psychotherapy research and (2) to study, within this research model, the effectiveness of two specific forms of psychotherapy (cognitive behavior therapy [CBT] and interpersonal psychotherapy [IPT]) for treating nonbipolar, nonpsychotic depressed outpatients. (Elkin et al., 1989, p. 971)

Field et al. ended their introduction by explaining that their study substituted EEG and the speed and accuracy of mathematical computations for the anecdotal evidence of the effects of massage therapy offered by past researchers. They hypothesized that subjects who received massage therapy would demonstrate enhanced alertness (decreased alpha and beta brain waves and better performance on math computations) and less stress (as measured by anxiety, depression, and cortisol levels) than controls given relaxation therapy.

13.2.4 Method

As its name implies, the Method section presents the methodological details of the study. Although additional subsections can be added to increase clarity and simplicity, this section usually is divided into the three labeled subsections discussed below: Participants (or Subjects, if the research tested animals), Apparatus (or Materials), and Procedure. Provided that all necessary information is reported, other headings might be substituted for clarity or simplicity (as was done in the Field et al. study).

Participants (or Subjects). This subsection includes the total number of subjects, as well as the number in each experimental group, their specific characteristics, and how they were recruited and assigned to conditions. Any special agreements with participants or payments made to them should be noted, as should the rates at which people declined to become involved or dropped out of the study.

Information on participants' major demographic characteristics (e.g., gender, age, and race/ethnicity) or other conditions pertinent to the research should be included. Use your judgment on which information to report. Religious affiliation might be important for some attitude surveys, for example, but it would not be relevant to a study of verbal learning. As a guideline, provide only information that will help in replicating the research or understanding the kinds of people to whom its results are likely to generalize.

Field et al. reported that they recruited participants from among the faculty and staff of the University of Miami School of Medicine. Their gender, education, income, extent of daily exercise, and answers to lifestyle questions— all relevant to the study's purposes and procedures—were assessed and reported, along with statistical analyses showing that the experimental and control groups were comparable prior to the treatment. The authors also described how they recruited participants (with advertising fliers) and assigned them to the experimental groups (randomization).

Because participants in research must be treated respectfully in the written report as well as in the conduct of the study itself, it is important to exercise care in selecting terms to refer to them. The *Publication Manual* points out that it is the responsibility of psychologists to

avoid perpetuating demeaning attitudes and biased assumptions about people in their writing. Constructions that might imply bias against persons on the basis of gender, sexual orientation, racial or ethnic group, disability, or age are unacceptable (APA, 2010, pp. 70-71).

Scientific writing should be free of implied or irrelevant evaluation of the group or groups being studied. (APA, 2010, p. 70)

The manual goes on to state:

If your writing reflects respect for your participants and your readers and if you write with appropriate specificity and precision, you will be contributing to the goal of accurate, unbiased communication (APA, 2010, p. 71).

For example, avoid using terms like *man* or *mankind* when referring to both men and women, selecting instead words like *people*, *humans*, *respondents*, or *men and women*. Similarly, instead of *he* or *his* (as in "we told each participant that he could quit whenever he wished," when both men and women participated), substitute plural nouns unambiguous for gender (e.g., "we told the participants that they could quit at any time."). Rather than describing participants as *disabled*, explain that they had spinal cord injuries. Whenever possible, replace general terms, like *the elderly*, with more specific terms, like *participants aged 65-90*.

Since language often subtly conveys cultural biases, the *Publication Manual* recommends reading your written work carefully with an eye to detecting any implied evaluation. One way the manual suggests to do this is to read what you have written substituting your own group for the group or groups you are discussing, or, alternatively, imagining that you are a member of the group you are writing about and gauging your own reaction to your words. Better still, have representatives from the groups who take part in your study read your report and give you their reactions to it, and take account of their responses and preferences in deciding on its final wording.

The APA also recommends that, whenever possible, authors acknowledge the collaborative role that people play in research by choosing more active terms, like *participants* or *respondents*, to refer to them rather than the traditional but more passive term *subjects*. The participants' share in the research also is better recognized by using the active rather than the passive form of verbs (e.g., "the children answered several questions about. ..." is active; "the children were interviewed" and "interviews were conducted with the children" are passive). Box 10, presented later in the chapter, includes additional examples of active and passive verbs.

When studying animals rather than people, report the total number of animals as well as the number in each experimental group. Also provide information on the animals' age, sex, weight, and general physiological condition, as well as other identifying information such as genus, species, and strain number. The name of the company that supplied the animals might also be helpful in replicating the research. Pertinent facts about how the animals were handled outside of the experimental setting also might be included for this reason.

Apparatus/materials. In this subsection, identify and describe the instruments and materials used in the research, including brand names and models, as well as the purposes to which they were put in the study. Again, some judgment is required here. The manufacturer of an instrument for measuring a complex physiological response, like EEG, usually would be reported; the brand name of an ordinary stopwatch or scale would not. In the report on the massage study, the authors provided information on the instruments they used to monitor EEG, as well as their settings, and all other information needed to duplicate their measures, including the computer software for analyzing EEG patterns. Their procedures for assessing participants' cortisol levels (a physiological measure of stress) were described in similar detail.

If equipment is specifically constructed for a study, detailed information on its design and measurements should be provided. Photographs or diagrams also might be included.

Similarly, the names and versions of psychological tests should be provided in this subsection, along with information on their reliability and validity. Observational schemes, like rating scales or category systems for recording behaviors, also should be identified and their measurement properties detailed. In their subsection entitled "Assessment Procedures," Field and her coauthors described both their long-term (e.g., the Life Events scale) and short-term measures (e.g., math computations). Their behavior rating scales also were carefully described, with accompanying statistics on validity and reliability. In addition, references were cited for each scale and measure so that interested readers would be able to learn more about them.

The amount of detail to report would depend on the measure. It would not be necessary to give the reliability or validity of widely used tests, since these would be generally acknowledged, but such information would be required for less popular measures. If tests were specifically developed for a study, they should be fully described, with documentation of their adequacy as measuring instruments.

Procedure. Although the procedure section should be as brief as possible, it should give enough information so that other researchers can replicate its essentials. Each step in the research, from the moment a subject's involvement began to when it ended, should be reported, including: instructions they were given, activities, events to which they were exposed, the timing of tasks, how the study ended, whether participants were paid for their involvement, and whether and how they were debriefed.

Field et al. provided enough information on the massage therapy so that other researchers could replicate it with the aid of a trained massage therapist. In addition, the purpose and treatment of the control group were presented, as were the order and timing of the various assessments of participants during the study.

13.2.5 Results

The results section reports on how the data were analyzed and the results of those analyses. Because this is the most technical section of the report, often filled with numbers and statistical terms, you may find it to be the hardest part of the report to write in an interesting manner. The challenge here is to present the technical material in a simple and engaging manner.



A participant in the Field et al. study receiving massage therapy

Box 4 presents the leads for the results sections of several published papers. If your study is straightforward and the measures are standard, well known procedures, you can begin this section with the study's most important findings. The first two entries in Box 4 begin in this way. However, as the other examples in the box show, often other leads are necessary to help readers interpret the findings that follow. For example, it might be necessary to include data on the characteristics and numbers of subjects who continued or dropped out of the experimental conditions, the nature and number of observations in naturalistic studies, or the reliability of measures. If the study involves an experimental manipulation, evidence may be provided demonstrating that it actually worked and to what degree.

Organization. Once such preliminaries have been covered, the findings must be presented in an organized format. There are three common ways to structure this presentation: (1) by time line, (2) by the type of dependent variable, and (3) by the importance of the results.

The time line organization is a natural for studies conducted in different phases. For example, Hentschel et al. (1993) organized the results of their study on the treatment of ulcers with antibiotics into two parts, using the headings Treatment Period and Follow-up Period.

When a study involves several dependent variables, the results often are organized into separate sections for each dependent variable or type of variable. In the report of their experiment on the effects of sugar on children, Wolraich et al. (1994) presented their results under separate headings for behavioral and cognitive measures and biochemical tests. The Field et al. massage study also used this type of organization.

If your research involved a primary analysis, testing the hypotheses discussed in the introduction, and a secondary analysis suggested by these results, consider organizing the results section into primary and secondary analyses. Elkin et al. (1989) did this in their report of their study evaluating the effectiveness of different psychotherapies. Although the main analysis indicated no significant differences between the therapies, a secondary analysis, taking into account the severity of patients' depression, did show differential effects. The authors organized the results under three main headings: Patient Characteristics, Attrition, and Outcome Analyses; the last section was divided into two subsections, titled Pretreatment-Posttreatment Differences and Secondary Analyses.

A good organization with well-chosen headings will help readers to easily understand your results. Carefully constructed figures and tables also clarify the presentation.

Tables and figures. If your results involve only a few numbers, they can be presented in the text. But if the results are extensive and involve several groups and dependent measures, by all means, present them in a table. The

BOX 4 LEADS FOR RESULTS SECTION

REPORT OF MAIN QUANTITATIVE RESULTS

The effect of light treatment on the patients' Hamilton scale scores is shown in Figure 1 and Table 2. Mean (\pm SD) Hamilton scores before, during, and after bright light treatment for outpatients were 22.9 ± 5.4 , 9.5 ± 4.4 , and 16.4 ± 5.8 , respectively ($p < .025$). (Rosenthal et al., 1985, p. 165)

The mean occurrence of each of the target behaviors across baseline, treatment and follow-up phases for the 12 role-play situations are presented in Table 1. (Frame, Matson, Sonis, Fialkov & Kazdin, 1982, p. 241)

ISSUES AFFECTING RESULTS

Description of Subjects and Dropout Rates

The characteristics of the 140 children who entered the study are shown in Table 1. The mean ages of the girls and the boys were similar, but the pubertal development of the girls was more advanced, as expected. (Johnston et al., 1992, p. 83)

Fifty-eight subjects were recruited for the study. Pilot studies of the first three subjects were used to refine the protocol; these children were therefore eliminated from the final analysis. Three subjects were eliminated because of poor compliance, as confirmed by the weekly urine tests for ascorbate and riboflavin; three withdrew before completing the study; and one (the youngest) was unable to complete the cognitive and behavioral assessments. (Wolraich et al., 1994, p. 303)

Nature and Number of Observations in Naturalistic Studies

A total of 364 pods were counted in 1991 and 395 in 1993, during the land-based surveys. The data sets for 1991 and 1993 were pooled for further analysis. (Brown & Corkeron, 1995, p. 167)

Excluding interjections and nonreferential onomatopoeia, the children in this sample produced a mean of 73.7 (SD = 30.28) wholly productive vocabulary types and 338.0 (SD = 251.77) vocabulary tokens in the 1-hr speech sample for which the following data were analyzed. (Tardif, 1996, p. 498)

Reliability of Observers

The agreement of judgments made by the examiner and blind judge for the three tests can be represented both as percent agreement and as the correlation between judgments (1 = innocent, 2 = inconclusive, 3 = deceptive). (Forman & McCauley, 1987, p. 693)

Base Line Conditions

At base line, the subjects ate their usual diets, which contained moderate amounts of fat (30.6 percent of energy), cholesterol (274 mg per day), and fiber (23.3 g per day) (Table 2). (Swain, Rouse, Curley, & Sacks, 1990, p. 149)

At base line, the use of psychoactive medication was comparable in the experimental and control nursing homes (Table 3). (Avorn et al., 1992, p. 170)

Field et al. study is a good example of the simplicity offered by well-laid-out tables. The major findings of this study were presented in two tables showing the means and standard deviations on the dependent measures for the conditions in the study. Table 2, in Appendix B, illustrates a common format for these tables.

The columns of the table correspond to the conditions of the study, massage therapy versus the control treatment, and within these two conditions, the pre- and post-treatment measures for the 1st and 10th days of the study. The rows give the results for the different dependent measures - depression, anxiety, math accuracy, etc. (The

results for the EEG measures are in Table 3.) The means and standard deviations of the measures are included in the body of the table.

A separate statistical analysis was performed on each variable. The subscripts of the means in Table 2 indicate the results of these tests. Within a row, all the means with a common subscript - *a*, *b*, or *c* - are not statistically different from each other. The means with different subscripts are significantly different, at $p < .05$.

For example, look at the row for math computation accuracy. The means for the control condition vary from 60.0_a to 72.3_a, the higher the score the greater the accuracy. All the means for the control condition have the same subscript, *a*. This indicates that these means are not significantly different from each other, so there is no evidence that the accuracy scores for the subjects in the control group changed during the study. For the massage condition, the means start at 69.2_a and increase to 96.2_c by the end of the study. The subscripts *a* and *c* indicate that these means are significantly different. The subjects receiving massage increased their mean accuracy scores during the study to a level significantly higher than the levels in the control condition.

Once you know this code for reporting the results of statistical tests, the table is easy to read and clearly communicates the major findings of the study. Examples of other APA style tables are shown in Box 5.

Figures are a good alternative to presenting results in the text or in tables when the amount of data is extensive or when the relationships are complex. Scatterplots showing the relationship between scores on two variables are common in psychological reports, as are histograms illustrating the distribution of scores on one variable, bar and line graphs of the means of treatment groups, and charts showing the sequence of events in an experiment.



BOX 5 APA FORMAT AND STYLE FOR TABLES AND FIGURES*Tables*

❑ Table 1 below illustrates how to present descriptive statistics for two experimental groups, each receiving different types of therapy; each row and column is labeled; and only horizontal lines are used to form the table.

❑ Table 2 shows results for a study with two independent variables.

Table 1

Hamilton Depression Scores at the Termination of Therapy

Therapy	<i>M</i>	<i>SD</i>	<i>n</i>
Cognitive	9.57	8.44	23
Prozac	10.41	9.39	20

Table 2

Hamilton Depression Scores for Severely and Moderately Depressed Patients at the Termination of Therapy

Symptoms	Type of Therapy	
	Prozac	Cognitive
Severe		
<i>M</i>	9.00	13.29
<i>SD</i>	4.09	3.91
<i>n</i>	15	14
Moderate		
<i>M</i>	12.21	8.87
<i>SD</i>	2.64	2.26
<i>n</i>	14	15

❑ Each table should be fully labeled. All tables (and figures) included in the paper must be referred to in the text; it should not be necessary to read the text to understand a table.

❑ Set up tables for clarity. Capitalize only the first letter of major words in titles. Italicize statistical symbols.

Figures

❑ Figures include graphs, charts, drawings, and photographs.

❑ Each figure should have a caption fully explaining the figure. It should not be necessary to read the text to understand a table.

❑ Use the figures in the Publication Manual of the American Psychological Association(6thEdition) as guides in designing figures

Box 5 also gives information on the recommended APA format for figures. Edward Tufte's book *The visual presentation of quantitative information* (1983) and its

sequel *Envisioning information* (1990) discuss how to construct figures with clarity and style.

Drawings and photographs also are useful for illustrating aspects of an experiment that are difficult to describe in the text, for example, the details of visual presentations, unique equipment, or involved spatial arrangements of the apparatus. Consider using a drawing or photograph when you think that readers will be unfamiliar with your materials and when realism and detail are essential. The apparatus used in the Held and Hein (1963) experiment on kittens, discussed in Chapter 6, is a good example of the value of pictures. This complex piece of equipment would be difficult to describe in words; the picture shown in Chapter 6 makes the equipment understandable.

Remember to refer to all tables and figures in the text, alerting your readers to the results revealed in them. Although the body of the results section is written in the past tense, because the study reports on research that is now complete, you should use the present tense to refer to findings in tables or figures that are currently under discussion. For example, "Table 2 shows that the massage group . . ." (see Box 9: Past vs. present tense, later in the chapter). Tables and figures should be assigned independent and consecutive numbers.

Statistical analyses. When describing results statistically, include both measures of central tendency (means, medians) and measures of variability, such as the standard deviation or interquartile range. In reporting statistical analyses, note the test that you used, the value of the test statistic, the degrees of freedom, the alpha level, and the direction of the effect. Examples of how to do this are given in Box 6, under the heading Reporting Statistical Results. Assume that your readers understand how to interpret these statistics. Box 6 also shows how to abbreviate statistical symbols and units of measure as well as when to report numbers in words or figures.

The results section should contain all the results of the study. Do not save some results or stories of colorful behavior to add interest to the discussion. Readers should be able to find out everything that happened in your research by reading the results. Incidentally, describing the behavior of individual subjects is an excellent way to add interest to the results section and to illustrate reactions to the treatment, or other behavior, that would be lost in a straight quantitative presentation.

13.2.6 Discussion

The introduction evaluates and interprets research published in the literature; the discussion does the same for the study being reported, helping readers understand how the research answers the questions posed in the introduction.

BOX 6 APA GUIDELINES FOR ABBREVIATING STATISTICAL SYMBOLS AND PRESENTING NUMBERS AND RESULTS OF STATISTICAL ANALYSES

Statistical Symbols

Abbreviate statistical terms as follows, using italics.

<i>Statistic</i>	<i>Abbreviation</i>
Fisher's test statistic	<i>F</i>
Cohen's effect size	<i>d</i>
alpha level for statistical test	<i>a</i>
mean	<i>M</i>
standard deviation	<i>SD</i>
quartile	<i>Q</i>
statistic for t test	<i>t</i>
statistic for chi-square test	χ^2
Pearson correlation coefficient	<i>r</i>
number of subjects in subsample	<i>n</i>
total number of subjects in sample	<i>N</i>
nonsignificant	<i>ns</i>

Units of Measure

- ☐ Abbreviate units of measure when they follow numerical values (e.g., 10 cm); otherwise write out the unit. The metric system is used in APA papers; non-metric values also should be expressed as metric values (e.g., the box was 6 in. high (15.24 cm). Note that in. has a period, but some other units do not.

<i>Unit of Measure</i>	<i>Abbreviation</i>
ante meridiem	a.m.
centimeter	cm
degree Fahrenheit	°F
gram	g
hour	hr
inch	in.
kilometer	km
liter	L
post meridiem	p.m.
second	s

Numbers

- ☐ In general, write the words for numbers less than 10 (e.g., two stimuli); express numbers 10 or greater in figures (e.g., 14 trials). Some exceptions are numbers linked with a unit of measure or time, number of subjects, and mathematical functions which always are written in figures (e.g., 7 mg, 2 days, and a ratio of 2:1). Express summary statistics and test statistics to 2 digits more than the raw data (e.g., if the raw data are whole numbers, the mean is written with two decimal places). Use a zero before the decimal point for numbers less than one (0.54); but do not use the leading zero for probability values, proportions, or values of r , because these statistics cannot have a value greater than one (e.g., $p < .05$).

Reporting Statistical Results

- ❑ Report the alpha level for each statistical test. If the same level is used throughout the report, use a single statement like "The alpha level was .05 for all tests."
- ❑ In addition to alpha, for each test report the following: the value of the test statistic, the degrees of freedom, and the p value. If available, present the effect size. For example:

t-test: A t-test showed that the means on the self-esteem scale of the experimental ($M = 18.4$, $SD = 5.6$, $n = 12$) and control groups ($M = 5.35$, $SD = 3.3$, $n = 14$) were significantly different at the alpha level of .05 for a two-tailed test, $t(24) = 7.37$, $p = .000$.

F test, analysis of variance: Table 1 shows the means and standard deviations for the measure of creativity for the four instructional sets. There was a significant effect of set at the alpha level of .05, $F(3,44) = 3.40$, $MSE = 10.20$, $p = .03$.

Correlation coefficient: The correlation between maze learning scores for the two groups of matched subjects was $r = .92$ ($n = 44$, alpha level of .05 for a two-tailed test, $p = .000$), indicating that the basis for matching was excellent.

Chi-square: 80% of the cognitive therapy patients dropped out, compared to 90% drop out for patients in interpersonal therapy, and 70% for drug therapy. These dropout rates were significantly different, $\chi^2(2, N = 150) = 6.25$, $p = .04$, with an alpha level of .05.

The discussion also evaluates the study's strengths and limitations to enable readers to better interpret its results.

As the "leads" in Box 7, reprinted from published studies, illustrate, the discussion often begins by summarizing the rationale and purpose of the research, giving its major results and conclusions, or commenting on their validity. Field et al. started their discussion by summarizing their findings and instructing readers on how to interpret them.

In addition to establishing whether the researchers' expectations were confirmed or disconfirmed, the discussion also considers how the findings fit with the results of past research. Are the findings similar to or different from the results reported by other investigators? In which ways? Field et al., for example, remarked that their finding of decreased depression for the massage group

BOX 7 LEADS FOR THE DISCUSSION SECTION

Summary of Rationale and Purpose of Study

Previous studies of the effectiveness of gun control have generally compared rates of homicide in nations with different approaches to the regulation of firearms. Unfortunately, the validity of these studies has been compromised by the large number of confounding factors that characterize national groups (Sloan et al., 1988, p. 1259)

In this preliminary investigation, we evaluated the procedure known as empirically derived consequences for developing a treatment package for pica. (Fisher et al, 1994, p. 455)

Summary of Major Result, Conclusion, Finding

We can be fairly certain that chimpanzees of the Ndoki forest make and use two different types of tools in combination to fish for and feed on termites. (Suzuki et al., 1995, p. 227)

The results are consistent with our thesis that self-produced movement with its concurrent visual feedback is necessary for the development of visually-guided behavior. (Held & Hein, 1963, p. 875)

Validity of Results

The clinical and demographic features of the population described here were typical of seasonal affective disorder patients we have reported on elsewhere. (Rosenthal et al, 1985, p. 168)

Estimates of pod size collected from different observation platforms can differ within one study area. Data on pod sizes collected in this study are from a high landbased observation platform which is likely to give reasonably unbiased estimates. (Brown & Corkeron, 1995, p. 172)

was consistent with other massage studies. Similarly, the enhanced alertness (decreased alpha and beta brain waves) in the massage group did not surprise them, given prior research findings on the effects of facial massage.

The last major decision you will have to make in writing your report is how to end your discussion. The examples of "closes" from published research studies, included in Box 8, illustrate a range of possibilities. As you can see there, your discussion might end by presenting the theoretical or practical implications of the research, offering qualifications of its results, or suggesting specific recommendations for future studies. Field et al. ended their paper by speculating on the causes of the massage therapy

group's enhanced alertness and suggesting other dependent variables to add to future studies. They also pointed to the need for longer-term follow-up studies, with steady large doses of massage, and of documenting the cost-effectiveness of massage therapy.

BOX 8 CLOSERS FOR DISCUSSION SECTION

Call for Action or Concern Based on Findings

Although our findings should be corroborated in other settings, our results suggest that a more restrictive approach to handgun control may decrease national homicide rates. (Sloan et al., 1988, p. 1261)

With the number of elderly patients in nursing homes projected to exceed 2 million by the end of this decade, such educational programs could enhance attempts to counter the overuse of psychoactive drugs in the vulnerable residents of these facilities. (Avorn et al, 1992, p. 172)

Speculative Hypotheses Explaining Findings

At present, it appears that the location of stands of fruit trees determine where chimpanzees travel, hence where they encounter and hunt colobus monkeys, but the explanation for why they hunt may lie more in social and reproductive rather than nutritional reasons. (Stanford et al., 1994, p. 17)

The present findings suggest that psychological influences play a major role in the maintenance, and perhaps the aetiology, of the disorder. (Azrin & Peterson, 1990, p. 317)

General Conclusion of the Study

We may now be in a position to say that chimpanzees can change and use the environment to their advantage by the use of tools. (Suzuki et al., 1995, p. 234)

These findings provide convincing evidence for a developmental process, in a least one higher mammal, which requires for its operation stimulus variation concurrent with and systematically dependent upon self-produced movement. (Held & Hein, 1963, p. 876)

Qualifications of the Major Result

It is important to note that pica was not eliminated completely with the introduction of treatment. (Fisher et al, 1994, p. 456)

Although multiple symptoms of the child's depression were successfully treated, the extent to which treatment eliminated the disorder remains unclear. (Frame et al, 1982, p. 242)

Suggestions/Plans for Future Research

Future publications reporting analyses of data obtained at 6-, 12- and 19- month follow-up evaluations will address these issues. (Elkin et al., 1989, p. 981)

13.2.7 References

The reference list, which comes at the end of the paper, links your research to previous work related to the same problem. Each study mentioned in the paper must appear among the references and each entry in the references must be referred to in the paper. (A bibliography includes works not cited in the text; a reference list does not.) Accuracy is essential, so be sure to photocopy the journal articles you use or carefully record references in your notes. The people who read your paper will use your references to find the articles, books, etc. that you cite.

The references should be listed in alphabetical order by the first author's surname. The APA *Publication Manual* specifies a precise format for reporting citations in the reference list. The general format is:

Author(s). (Year). Title. Publishing information.

Each reference ends with a period and is divided by periods into four major parts: (1) the author(s), (2) year of publication, (3) title, and (4) where, and, in the case of books or chapters in books, by whom, the work was published. Examples of the required format for a journal article, a book, and a chapter in a book, follow.

Journal article:

Suzuki, S., Kuroda, S., & Nishihara, T. (1995). Tool-set for termite-fishing by chimpanzees in the Ndoki forest, Congo. *Behaviour*, *132*, 219-35.

Book:

Garvey, W. D. (1979). *Communication: The essence of science*. Elmsford, NY: Pergamon Press.

Chapter in a book:

Bern, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1-62). New York: Academic Press.

General Format for an Online Periodical:

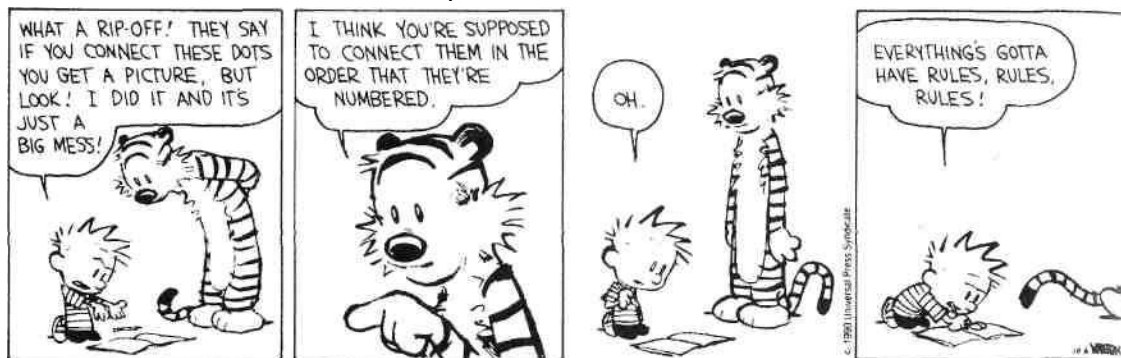
Author, A. A., Author, B. B., & Author, C. C. (2000). *Title of article. Title of Periodical, xx, xxx-xxx. Doi: xx.xxxx/xxxxx*

See Chapter 7 Reference Examples (*Publication Manual of the American Psychological Association (6th ed.)*) for specifics on how to format other types of references.

Notice that:

- Each reference should be double-spaced and should have a hanging indent format (The first line begins flush left, the second and subsequent lines are indented.)
- Authors' surnames are presented first, followed by their initials.
- Authors' names are separated by commas and the symbol & is used rather than the word *and*.
- Only list up to and including six authors. If there are seven or more authors, do not include the names of authors after six. Instead, use the abbreviation "et al." (et al is not italicized and ends with a period).
- Only the first word of titles and subtitles begin with a capital.
- The titles of books are italicized; the titles of articles are not.
- The name and volume number of journals are italicized.
- The publishing data for a journal article includes the name of the journal, its volume number, and the page numbers.
- The publishing data for a book is the publishing company and the city of its home office; the city is presented first, followed by a colon, then the name of the publishing company.
- The publishing data for electronic sources is where the document is located online – the doi (see the publication manual).
- References end with a period, unless the retrieval element for an online source ends with an Internet address.

• **Calvin and Hobbes** by Bill Watterson



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For specific formats for reference types consult the *APA Publication Manual*, which should be available at your library.

13.2.8 Appendix, Author Note, Footnotes, Tables, and Figures

As the overview in Box 1 shows, the references may be followed by an appendix, author note, footnotes, tables, and figures. Box 1 describes the content and format of these sections. Although the Field et al. report had no figures or footnotes, it did include tables, which we already have discussed. The author note for the Field et al. paper illustrates the typical contents of this part of the report.

Most research articles, like the massage therapy study, do not include an appendix. However, your professor may require an appendix presenting your "raw" (unanalyzed) data, as well as other supporting information to show what you did in the study, for example, your questionnaires, instructions, debriefing questions, etc.

13.3 APA EDITORIAL STYLE

So far, we have discussed the organization and contents of the research report and some of the APA's editorial style specifications. In this section, we complete our presentation of the how-tos of writing research papers according to the APA style. The rules for format and style published by the APA reflect the current writing practices of psychologists. Contrary to what you might think, the rules aren't there to frustrate you; they're meant to help. Using them creates uniformity of presentation in the psychological literature and so facilitates communication among researchers.

Box 9 shows the APA format for pages and headings, abbreviations, and the past and present tense of verbs. These rules of style, in conjunction with the guidelines we have presented already and the model manuscript, should provide you with the information you need to write a research report in the APA style.

The *APA Publication Manual* also makes recommendations to improve the readability of research reports. Although it used to be standard practice in psychology to write research reports in the passive voice and for authors to avoid

Page Setup

- Type text on 8 1/2 by 11-inch white paper, with at least one-inch margins on all sides. Double-space all text (title page, abstract, the body of the paper, and references), left justified with a ragged right edge.
- Number all pages consecutively in the upper right-hand corner, at least one inch from the right edge of the paper, in the space between the top edge of the paper and the first line of text.
- The running head, printed at the top of each page of a published article, is typed on the title page and on each page of the manuscript, flush with the left margin, at least one inch from the top edge of the paper.
- Indent the first line of each paragraph. The single exception is the abstract, which is typed as a block. Each reference in the reference list is treated as a separate paragraph.

Title, Author Affiliation, and Headings

- All information on the title page is centered, except for the running head and page number, as are all major headings in the paper. The title, which is repeated on the first page of the introduction, also is centered. All information on the title page, with the exception of the running head, and headings are typed in lowercase letters with the first letter of major words capitalized.
- Begin all parts of the paper except the introduction with its appropriate heading: Abstract, Method, Results, Discussion, References, Appendix, Author note, Footnotes, Figure captions. The introduction begins on a new page with the title of the paper centered at the top, and with no other heading.
- Use the formats below for papers with one, two, or three levels of headings. See the Publication Manual of the American Psychological Association (6th Ed., pp. 62-63)

Method [Bold, centered,
and capitalized]

Participants [Justify flush left, bold, and capitalize the first letter of major words.]

Measures [Justify **flush** left, bold, and capitalize the first letter of major words.]

Rating scales [**Indent**, bold, and capitalize the first word. End heading with a period. Continue text on **the** same line.].

Self-report scales.

Procedures

Results

Reliability Analysis

Comparative analysis

Discussion

Abbreviations

- Use abbreviations sparingly, only when they aid communication.
- Explain abbreviations when you first use them (e.g., Wechsler Adult Intelligence Scale (WAIS)), then use the abbreviation consistently.
 - Do not start a sentence with a lowercase abbreviation.
- Use appropriate Latin abbreviations in the text of your paper if they are enclosed by parentheses; otherwise, use the corresponding English phrase. The abbreviation et al. is an exception. When citing a reference for the first time, use et al. to refer to authors after the first only if there are six or more authors. After the first citation, use et al. when the reference has three or more authors. If the reference has two authors never use et al. A list of common abbreviations follows.

<i>Meaning</i>	<i>Abbreviation</i>
that is	i.e.,
For example	e.g.,
versus	vs.
compare	cf.
and so forth	etc.
namely	viz.,
and others	et al.

Past vs. Present Tense

- Use the past tense to refer to the research of other authors in the introduction and discussion sections (e.g., "Brown (1993) **found** that").
 - Also describe procedures (in the method section) and report and discuss results (in the results section) in the past tense, for example, "The mean creativity score was 6.5."
- Use the present tense when discussing the results presented in your tables or figures, for example, "Table 1 shows that Instructional Set 1 results in higher creativity scores than the other three sets."
- Write the discussion in the present tense, for example, "The results confirm the prediction that. . ."

at all costs referring to themselves using first-person pronouns, this is no longer the case. Since 1994, the two most recent *Publication Manuals* (APA, 1994,2000) encourage authors to use the active voice and to refer to themselves when doing so promotes clarity.

Since it is not always easy to distinguish between active and passive verbs, Box 10 illustrates the differences between them. Although it is now acceptable to refer to yourself ("I met with subjects to debrief them"), you should do so sparingly. Too much discussion of you, and the emphasis shifts away from the research, which should be the focus.

13.4 WRITING WITH "STYLE"

Clarity, accuracy, and conciseness are the bare bones of scientific communication. But one thing more is needed in good scientific writing. Your clear, accurate, and concise report should be written with what is sometimes called "style." Georges Louis Buffon, an 18th-century French naturalist, who was recognized by the Academie Francais for his excellent use of the French language,

BOX 10 ACTIVE VERSUS PASSIVE VOICE

- Passive verbs have a form of "to be" and a past participle; for example, "The data were collected in the waiting room."
- Use the active voice (any form but the passive) whenever possible, for example, "The patients filled out the questionnaire in the waiting room."

<i>Passive Voice</i>	<i>Active Voice</i>
The study was designed to test. . .	I designed the study to test. . . (one author)
The film was presented to the children.	The children watched a 30-minute film.
The means are given in Table 1.	Table 1 illustrates that the mean of Group A is. . . .
The stimuli were chosen to vary in color.	We chose the stimuli to vary in color. (more than one author)
A t-test was done to compare. . . .	The t-test showed that the experimental group. . . . Or Using a t-test, we found a significant difference between the means. . . .

defined style as "the order and movement one puts into one's thoughts" (Shortland & Gregory, 1991, p. 53). To achieve style requires going beyond simply getting your ideas on paper to expressing them in a lively, engaging, and pleasing manner. According to Shortland and Gregory:

Order is the structure you put on your paper. Movement is what carries the reader from one idea or event to the next. It is what ensures that the reader who picks up your article will see it through. (Shortland & Gregory, 1991, p. 53)

Let's look at structure, the first ingredient of writing with style. To some extent, following the APA format that we have outlined guarantees that your paper will have structure. So when we speak of structure here, we are thinking about the organization you impose on the material within each section of your paper. We hope that the suggestions that we have made so far have given you a good understanding of how to structure the separate sections of your paper. Beyond that, developing good structure in your writing involves careful thought about what you want to say and how you want to say it. Discussing your ideas with professors and fellow students is a good way to figure out what you want to say.

One key to writing a well-structured paper is creating good transitions. Marsha Dutton, a professor of English, compares transitions in written work to the prongs on Lego blocks; both are involved in "holding together elements that might otherwise slide apart because of an absence of obvious connection" (Dutton, 1996, p. 16). She continues:

Here's another metaphor for transitions: train passengers wishing to move from their seats to the dining car are grateful for the overlapping pieces of metal between cars that allow them to walk from one car to another rather than leaping across open space. Those metal gangplanks are transitions, keeping travelers from falling to the tracks below, just as your transitions keep readers from losing the train of your argument. (Dutton, 1996, p. 16)

With good transitions the links between ideas are apparent and each idea leads smoothly and logically to the next. The *Publication Manual* lists several sorts of transitional words that you should pay careful attention to as you write:

time links (then, next, after, while, since), cause-effect links (therefore, consequently, as a result), addition links (in addition, moreover, furthermore, similarly), and contrast links (but, conversely, nevertheless, however, although, whereas). (APA, 2001, p. 32)

The second component of writing with style is movement. One way to make your writing lively is to follow the APA suggestion that, whenever possible, you use active rather than passive verbs. Another is careful editing. Your writing will be livelier if you work at making it easy to read. To do this, select the most basic words, remove all spelling errors, repetition and typos, and check for grammatical errors. A good way to spot awkward expressions, difficult-to-understand spots, and rough transitions is to

read your report out loud. This also will alert you to overly long sentences and language that is too complex or artificial.

13.5 ORAL PRESENTATIONS

Before journals became popular, most scientists kept up with each other's work through correspondence (Garvey, 1979). Because there is an unavoidable delay between when research is done and when it is published, informal communication prior to publication still is the norm rather than the exception in science. In fact, Garvey reports that about 90% of the material published in scientific journals already has been communicated to other scientists informally through other means—in one-on-one meetings, at college colloquia where researchers present their work to faculty and students, and at local, state, regional, and national conferences. Groups of scientists working on similar problems (sometimes called "invisible colleges") keep up with each other's work by getting together regularly to discuss it, sometimes at conferences.

Although some scientists attend conferences primarily to meet with other scientists, most go to listen to presentations. In paper sessions, researchers give brief oral reports of research studies (usually 15 minutes or less). Such presenters receive requests for copies of their papers from interested parties who are unable to attend. In poster sessions, which are less formal than brief presentations, researchers display typed reports of their research. Those who attend can read the report and ask questions about it.

You may want to attend one of these conferences to get ideas, to keep up on the latest research, or even to present your study to other psychologists. Since it is easier to get a paper accepted for presentation at a professional conference than to publish it, conferences are a great way for young researchers to share their work, to get helpful feedback, and to test the waters to find out whether their work is likely to be accepted for publication.

For the most part, the format for presenting one's research at conferences is the same as it is for writing the study for publication. But an oral presentation cannot be as detailed as a written report; listeners cannot follow that much detail. So be selective in reporting your results. Present only indispensable information that your listeners need to understand your study, and concentrate on speaking in clear and simple language.

No matter how much we prepare, almost everyone other than the seasoned public speaker has some jitters about giving an oral presentation to peers. Because the anxiety of giving a talk stems from concerns that our work might be negatively evaluated, it is wise to avoid dwelling on this possibility. The best way we know to do this is to concentrate on the ideas you want to get across in your presentation. The more you focus on what your listeners need to know to understand your research, the more you will find your anxiety being replaced by positive energy, as the following excerpt from Richard Feynman's autobiography illustrates.

The excerpt describes an experience Feynman, now a Nobel Prize-winning physicist, had early in his scientific career. He had just learned that Albert Einstein and Wolfgang Pauling, in his words, "monster minds" of physics, were in the audience for the very first talk of his professional career:

Then the time came to give the talk, and here are these *monster minds* in front of me, waiting! My first technical talk, and I have this audience! . . . they would put me through the wringer! I remember very clearly seeing my hands shaking as they were pulling out my notes from a brown envelope. But then a miracle occurred, as it has occurred again and again in my life, and it's lucky for me: the moment I start to talk about physics, and have to concentrate on what I'm explaining, nothing else occupies my mind—I'm completely immune to being nervous. So after I started to go, I just didn't know who was in the room. I was only explaining this idea, that's all. (Feynman, in Shortland & Gregory, 1991, p. 121)

In addition to following Feynman's principle, it also helps to rehearse by presenting your paper to your roommate, an encouraging friend, or the professor who sponsored your paper at the conference. If this is too difficult at first, rehearse with a tape recorder. Better still, present your paper to your dog. You'll get as much practice as you need, avoid negative feedback, and get tons of appreciation in the mix.

13.6 ETHICS OF SCIENTIFIC COMMUNICATION

In Chapter 7, we discussed the principles and code of conduct developed by the APA for human and animal research. We complete this presentation in this chapter by discussing the APA's six ethical standards for publishing and reviewing research (reprinted in Box 11).

In 1830, Charles Babbage, a British mathematician, developed a classification of dishonesty in reporting data that Morton Hunt believes "serious discussion of scientific fraud has not improved on" (Hunt, 1981, p. 50). Babbage categorized fraudulent data analysis into three types: "forging," or inventing and recording observations that actually never were collected; "trimming," or improving data by "clipping off little bits here and there which differ most in excess from the mean and in sticking them on to those which are too small," and "cooking," or selecting for analysis only those data which confirm one's hypotheses and discarding the rest (Babbage, in Hunt, 1981, pp. 46,50). Because such dishonesty is intolerable in science, the first of the APA's principles focuses on this.

Principle 6.21 in Box 11 specifies that it is unethical for psychologists to fabricate data or falsify results. If significant errors in published research are discovered, this principle requires psychologists to acknowledge these and publish corrections. It is the ethical responsibility of psychologists to prevent misinformation from contaminating scientific knowledge by deliberate falsification, the focus of the APA principle, or by carelessness in reporting or analyzing data. When scientists are

accused of deliberate dishonesty, because of the seriousness of the offense, positions are lost and reputations ruined.

BOX 11 APA ETHICAL STANDARDS: COMMUNICATING AND REVIEWING RESEARCH

6.21 Reporting of Results

- (a) Psychologists do not fabricate data or falsify results in their publications.
- (b) If psychologists discover significant errors in their published data, they take reasonable steps to correct such errors in a correction, retraction, erratum, or other appropriate publication means.

6.22 Plagiarism

Psychologists do not present substantial portions or elements of another's work or data as their own, even if the other work or data source is cited occasionally.

6.23 Publication Credit

- (a) Psychologists take responsibility and credit, including authorship credit, only for work they have actually performed or to which they have contributed.
- (b) Principal authorship and other publication credits accurately reflect the relative scientific or professional contributions of the individuals involved, regardless of their relative status. Mere possession of an institutional position, such as Department Chair, does not justify authorship credit. Minor contributions to the research or to the writing for publications are appropriately acknowledged, such as in footnotes or in an introductory statement.
- (c) A student is usually listed as principal author on any multiple-authored article that is substantially based on the student's dissertation or thesis.

6.24 Duplicate Publication of Data

Psychologists do not publish, as original data, data that have been previously published. This does not preclude republishing data when they are accompanied by proper acknowledgment.

6.25 Sharing Data

After research results are published, psychologists do not withhold the data on which their conclusions are based from other competent professionals who seek to verify the substantive claims through reanalysis and who intend to use such data only for that purpose, provided that the confidentiality of the participants can be protected and unless legal rights concerning proprietary data preclude their release.

6.26 Professional Reviewers

Psychologists who review material submitted for publication, grant, or other research proposal review respect the confidentiality of and the proprietary rights in such information of those who submitted it.

Scientific research builds on the contributions of scientists of the past who must be given credit for their work. Principles 6.22 and 6.23 in Box 11 have to do with giving credit where credit is due. Principle 6.22 states that it is unethical for psychologists to "present substantial portions or elements of another's work or data as their own, even if the other work or data source is cited occasionally." Always cite sources for ideas that helped to shape your own. Although excessive use of quotations is discouraged in scientific writing, when necessary, quote, citing the source of the quoted material.

Principle 6.23 explains how credit is assigned among coworkers in publishing. The order of the authors' names in published research should reflect the magnitude of their contributions, the first author having done the greatest amount, followed by the second, and so on. One's professional status alone should not influence the order of authorship. When students do the lion's share of the work, as in dissertations and theses, they should be listed as principal author.

Principles 6.24 and 6.25 focus on data. The first asserts that in research articles psychologists do not misrepresent data that has been published previously as original data. The next asserts that it is unethical to withhold data from other competent professionals who wish to verify results through reanalyzing it. The only exceptions are when the confidentiality of participants could not be preserved if the data were shared or when the law prohibits release of the data.

The final principle, 6.26, guides the work of peer reviewers. It states that it is the ethical responsibility of professional reviewers to "respect the confidentiality of and the proprietary rights" of those who submit work to them for review. Reviewers safeguard the ideas contained in research proposals, proposals for grants, and reports submitted for publication, thereby protecting the priority of the ideas within them and the reputations of researchers whose work is ill conceived.

13.7 FINAL THOUGHTS

With this discussion of ethics, we complete our presentation of the principles and mechanics of psychological report writing, thus ending our discussion of the cycles of scientific research that we introduced in the first chapter of this book. The cycle of discovery ends for any project when the data have been collected and analyzed. The cycle of validation begins with the scientific report and ends when other scientists read and respond to the research.

We began this chapter with a quote from William Garvey, who wondered why intelligent people would spend their lives working on creations that others try to find fault with. His answer was that it is "fascinatingly challenging— to wrestle from nature her secrets and formulate them in such simple and comprehensible language that they are indisputable." By now, you probably have experienced some of the excitement and challenge of designing and conducting research, and learning its results. You have yet to struggle with how to present your work clearly, accurately, and concisely to fellow researchers.

As you begin, let the excitement of making a contribution to science and of being a part of an honorable tradition, tracing back to the Royal Society and beyond, inspire you to put your best effort into this last phase of your research. We think you will find it well worth the effort. In the words of Shortland and Gregory:

There is immense enjoyment to be had from communicating science. You have a fascinating piece of experience to convey and there is great personal pleasure to be had from conveying it well. Writing well, or communicating in any medium effectively, is as satisfying as any other important, stressful, difficult and tiring job well done. That, finally, is what is going to keep you going for hour after hour of rewriting, rehearsing and filing page after page in the rubbish basket, until you finally produce something of which you can be proud. (Shortland & Gregory, 1991, p. 11)

13.8 KEY TERMS

The Royal Society

Philosophical Transactions

Mind

APA Publication Manual

Abstract

Introduction

Literature Review

Rationale

Method

Participants vs. subjects

Results

Discussion

Reference list

Citations

Transitions

Writing with style

Figure caption

Forging, trimming, and cooking

Plagiarism

Publication credit

13.9 KEY PEOPLE

Henry Oldenbourg

Alexander Bain

Charles Babbage

Tiffany Field

Murray Sidman

13.10 REVIEW QUESTIONS

1. What was the Royal Society's strategy for making valid pronouncements on scientific matters?
2. Why were journals advantageous for reporting scientific work?
3. Why did journal editors adopt a system of peer review of research articles?
4. What was psychology's first journal and when was it first published?
5. Why did the members of the Royal society want to dissociate themselves from the alchemists?
6. What are four characteristics of scientific writing?
7. List the major sections of an APA research report in the order in which they appear.
8. What information goes into the title of a research report?
9. What kinds of information about the study should be included in the abstract?
10. What are the three general sections of the introduction, in the order in which they usually appear?
11. What are the three most common subsections of the method section?
12. How can you avoid sexist language in a research report?
13. What level of detail should be given in the procedure section?
14. What information should you report on the statistical analysis you conducted on your data?
15. What are three different strategies for organizing the results section of a research paper?
16. Explain how subscripts are used in a table to present the results of statistical tests.
17. What tense is used to present the method and results? When is the present tense used to discuss results?
18. What is the purpose of the discussion?
19. How are most discussion sections organized?
20. What is the general format for reporting a citation in the reference list?
21. What are the correct abbreviations for: "that is," "for example," "and so forth," "and others," and "namely"?
22. What are transitions and what functions do they serve?
23. Distinguish between passive and active verbs.
23. Distinguish between passive and active verbs. What recommendations does the APA make on using these verb forms?
24. What are the two major components of writing "with style"?

26. Identify the different forms of dishonesty in reporting data that Charles Babbage described. What do the APA ethical guidelines have to say about these?

27. What is a psychologist's ethical responsibility with regard to sharing data with colleagues?