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Research Questions and Hypotheses

Investigators place signposts to carry the reader through a plan for a study. The first signpost is the purpose statement, which establishes the central intent for the study. The next would be the research questions or hypotheses that narrow the purpose statement to predictions about what will be learned or questions to be answered in the study. This chapter begins by advancing several principles in designing qualitative research questions and helpful scripts for writing these questions. It then turns to the design of quantitative research questions and hypotheses and ways to write these elements into a study. Finally, it advances the use of research questions and hypotheses in mixed methods studies, and it suggests the development of a unique mixed methods question that ties together the quantitative and qualitative components of a study.

QUALITATIVE RESEARCH QUESTIONS

In a qualitative study, inquirers state research questions, not objectives (i.e., specific goals for the research) or hypotheses (i.e., predictions that involve variables and statistical tests). These research questions assume two forms: (a) a **central question** and (b) associated subquestions.

- *Ask one or two central research questions.* The central question is a broad question that asks for an exploration of the central phenomenon or concept in a study. The inquirer poses this question, consistent with the emerging methodology of qualitative research, as a general issue so as to not limit the views of participants. To arrive at this question, ask, “What is the broadest question that I can ask in the study?” Beginning researchers trained in quantitative research might struggle with this approach because they are accustomed to reverse thinking. They narrow

the quantitative study to specific, narrow questions or hypotheses based on a few variables. In qualitative research, the intent is to explore the general, complex set of factors surrounding the central phenomenon and present the broad, varied perspectives or meanings that participants hold. The following are guidelines for writing qualitative research questions:

- *Ask no more than five to seven subquestions in addition to your central questions.* Several subquestions follow each general central question; they narrow the focus of the study but leave open the questioning. This approach is well within the limits set by Miles and Huberman (1994), who recommended that researchers write no more than a dozen qualitative research questions in all (central and subquestions). The subquestions, in turn, become specific questions used during interviews (or in observing or when looking at documents). In developing an interview protocol or guide, the researcher might ask an icebreaker question at the beginning, for example, followed by five or so subquestions in the study (see Chapter 9). The interview would then end with an additional wrap-up or summary question or ask, as I did in one of my qualitative case studies, “Who should I turn to, to learn more about this topic?” (Asmussen & Creswell, 1995).
- *Relate the central question to the specific qualitative strategy of inquiry.* For example, the specificity of the questions in ethnography at this stage of the design differs from that in other qualitative strategies. In ethnographic research, Spradley (1980) advanced a taxonomy of ethnographic questions that included a mini-tour of the culture-sharing group, their experiences, use of native language, contrasts with other cultural groups, and questions to verify the accuracy of the data. In critical ethnography, the research questions may build on a body of existing literature. These questions become working guidelines rather than proven truths (Thomas, 1993, p. 35). Alternatively, in phenomenology, the questions might be broadly stated without specific reference to the existing literature or a typology of questions. Moustakas (1994) talked about asking what the participants experienced and what contexts or situations in which they experienced it. A phenomenological example is “What is it like for a mother to live with a teenage child who is dying of cancer?” (Nieswiadomy, 1993, p. 151). In grounded theory, the questions may be directed toward generating a theory of some process, such as the exploration of a process as to how caregivers and patients interact in a hospital setting. In a qualitative case study, the questions may address a description of the case and the themes that emerge from studying it.
- *Begin the research questions with the words what or how to convey an open and emerging design.* The word why often implies that the researcher

is trying to explain why something occurs, and this suggests to me probable cause-and-effect thinking that I associate with *quantitative* research and that limits the explanations rather than opening them up for participant views.

- *Focus on a single phenomenon or concept.* As a study develops over time, factors will emerge that may influence this single phenomenon, but begin a study with a single focus to explore in great detail. I often ask, “What is the one, single concept that you want to explore?”
- *Use exploratory verbs that convey the language of emerging design.* These verbs tell the reader that the study will do the following:
 - Report (or reflect) the stories (e.g., narrative research)
 - Describe the essence of the experience (e.g., phenomenology)
 - Discover (e.g., grounded theory)
 - Seek to understand (e.g., ethnography)
 - Explore a process (e.g., case study)
- *Use these more exploratory verbs as nondirectional rather than directional words that suggest quantitative research, such as affect, influence, impact, determine, cause, and relate.*
- *Expect the research questions to evolve and change during the study in a manner consistent with the assumptions of an emerging design.* Often in qualitative studies, the questions are under continual review and reformulation (as in a grounded theory study). This approach may be problematic for individuals accustomed to quantitative designs in which the research questions remain fixed and never change throughout the study.
- *Use open-ended questions without reference to the literature or theory unless otherwise indicated by a qualitative strategy of inquiry.*
- *Specify the participants and the research site for the study if the information has not yet been given.*

Here is a typical script for a qualitative central question:

_____ (How or what?) is the _____ (“story for” for narrative research; “meaning of” the phenomenon for phenomenology; “theory that explains the process of” for grounded theory; “culture-sharing pattern” for ethnography; “issue” in the “case” for case study) of _____ (central phenomenon) for _____ (participants) at _____ (research site).

The following are examples of qualitative research questions drawn from several types of strategies.

Example 7.1 A Qualitative Central Question From an Ethnography

Finders (1996) used ethnographic procedures to document the reading of teen magazines by middle-class European American seventh-grade girls. By examining the reading of teen zines (magazines), the researcher explored how the girls perceive and construct their social roles and relationships as they enter junior high school. She asked one guiding central question in her study:

How do early adolescent females read literature that falls outside the realm of fiction? (p. 72)

Finders's (1996) central question began with *how*; it used an open-ended verb, *read*; it focused on a single concept—the literature or teen magazines; and it mentioned the participants, adolescent females, as the culture-sharing group. Notice how the author crafted a concise, single question that needed to be answered in the study. It was a broad question to permit participants to share diverse perspectives about reading the literature.

Example 7.2 Qualitative Central Questions From a Case Study

Padula and Miller (1999) conducted a multiple case study that described the experiences of women who went back to school, after a time away, in a psychology doctoral program at a major midwestern research university. The intent was to document the women's experiences, providing a gendered and feminist perspective for women in the literature. The authors asked three central questions that guided the inquiry:

- (a) How do women in a psychology doctoral program describe their decision to return to school? (b) How do women in a psychology doctoral program describe their re-entry experiences? And (c) How does returning to graduate school change these women's lives? (p. 328)

These three central questions all began with the word *how*; they included open-ended verbs, such as *describe*, and they focused on three aspects of the doctoral experience—returning to school, reentering, and changing. They also mentioned the participants as women in a doctoral program at a midwestern research university.

QUANTITATIVE RESEARCH QUESTIONS AND HYPOTHESES

In quantitative studies, investigators use quantitative research questions and hypotheses, and sometimes objectives, to shape and specifically focus the purpose of the study. **Quantitative research questions** inquire about the relationships among variables that the investigator seeks to know. They are frequently used in social science research and especially in survey studies. **Quantitative hypotheses**, on the other hand, are predictions the researcher makes about the expected outcomes of relationships among variables. They are numeric estimates of population values based on data collected from samples. Testing of hypotheses employs statistical procedures in which the investigator draws inferences about the population from a study sample (see also Chapter 8). Hypotheses are used often in experiments in which investigators compare groups. Advisers sometimes recommend their use in a formal research project, such as a dissertation or thesis, as a means of stating the direction a study will take. Objectives, on the other hand, indicate the goals or objectives for a study. They often appear in proposals for funding, but tend to be used with less frequency in social and health science research. Because of this, the focus here will be on research questions and hypotheses.

Here is an example of a script for a quantitative research question describing outcomes of score for a variable:

What is the frequency and variation of scores on _____
(name the variable) for _____(participants) in the study?

Here is an example of a script for a quantitative research question focused on examining the relationship among variables:

Does _____(name the theory) explain the relationship between
_____(independent variable) and _____(dependent variable),
controlling for the effects of _____(control variable)?

Alternatively, a script for a quantitative **null hypothesis** might be as follows:

There is no significant difference between _____(the control
and experimental groups on the independent variable) on _____
(dependent variable).

Guidelines for writing good quantitative research questions and hypotheses include the following.

- The use of variables in research questions or hypotheses is typically limited to three basic approaches. The researcher may *compare* groups on

- an independent variable to see its impact on a dependent variable (this would be an experiment or group comparisons). Alternatively, the investigator may *relate* one or more independent variables to one or more dependent variables (this would be a survey that correlates variables). Third, the researcher may *describe* responses to the independent, mediating, or dependent variables (this would be a descriptive study). Most quantitative research falls into one or more of these three categories.
- The most rigorous form of quantitative research follows from a test of a theory (see Chapter 3) and the specification of research questions or hypotheses that logically follow from the relationship among variables in the theory.
- The independent and dependent variables must be measured separately and not measured on the same concept. This procedure reinforces the cause-and-effect logic of quantitative research.
- To eliminate redundancy, write only research questions or hypotheses—not both—unless the hypotheses build on the research questions. Choose the form based on tradition, recommendations from an adviser or faculty committee, or whether past research indicates a prediction about outcomes.
- If hypotheses are used, there are two forms: (a) null and (b) alternative. A null hypothesis represents the traditional approach: It makes a prediction that in the general population, no relationship or no significant difference exists between groups on a variable. The wording is, “There is no difference (or relationship)” between the groups. The following example illustrates a null hypothesis.

Example 7.3 A Null Hypothesis

An investigator might examine three types of reinforcement for children with autism: (a) verbal cues, (b) a reward, and (c) no reinforcement. The investigator collects behavioral measures assessing social interaction of the children with their siblings. A null hypothesis might read as follows:

There is no significant difference between the effects of verbal cues, rewards, and no reinforcement in terms of social interaction for children with autism and their siblings.

- The second form, popular in journal articles, is the alternative or **directional hypothesis**. The investigator makes a prediction about the expected outcome, basing this prediction on prior literature and studies on

the topic that suggest a potential outcome. For example, the researcher may predict that “scores will be higher for Group A than for Group B” on the dependent variable or that “Group A will change more than Group B” on the outcome. These examples illustrate a directional hypothesis because an expected prediction (e.g., higher, more change) is made. The following illustrates a directional hypothesis.

Example 7.4 Directional Hypotheses

Mascarenhas (1989) studied the differences between types of ownership (state-owned, publicly traded, and private) of firms in the offshore drilling industry. Specifically, the study explored such differences as domestic market dominance, international presence, and customer orientation. The study was a controlled field study using quasi-experimental procedures.

Hypothesis 1: Publicly traded firms will have higher growth rates than privately held firms.

Hypothesis 2: Publicly traded enterprises will have a larger international scope than state-owned and privately held firms.

Hypothesis 3: State-owned firms will have a greater share of the domestic market than publicly traded or privately held firms.

Hypothesis 4: Publicly traded firms will have broader product lines than state-owned and privately held firms.

Hypothesis 5: State-owned firms are more likely to have state-owned enterprises as customers overseas.

Hypothesis 6: State-owned firms will have a higher customer-base stability than privately held firms.

Hypothesis 7: In less visible contexts, publicly traded firms will employ more advanced technology than state-owned and privately held firms.
(pp. 585–588)

- Another type of alternative statement is the **nondirectional hypothesis**—a prediction is made, but the exact form of differences (e.g., higher, lower, more, less) is not specified because the researcher does not know what can be predicted from past literature. Thus, the investigator might write, “There is a difference” between the two groups. An example follows that incorporates both types of hypotheses.

Example 7.5 Nondirectional and Directional Hypotheses

Sometimes directional hypotheses are created to examine the relationship among variables rather than to compare groups because the researcher has some evidence from past studies of the potential outcome of the study. For example, Moore (2000) studied the meaning of gender identity for religious and secular Jewish and Arab women in Israeli society. In a national probability sample of Jewish and Arab women, the author identified three hypotheses for study. The first is nondirectional and the last two are directional.

- H₁: Gender identity of religious and secular Arab and Jewish women are related to different sociopolitical social orders that reflect the different value systems they embrace.
- H₂: Religious women with salient gender identity are less socio-politically active than secular women with salient gender identities.
- H₃: The relationships among gender identity, religiosity, and social actions are weaker among Arab women than among Jewish women.

- Unless the study intentionally employs demographic variables as predictors, use nondemographic variables (i.e., attitudes or behaviors) as **mediating variables** or **moderating variables**. These are variables that either “stand between” the independent and dependent variables or they moderate the influence of the independent variable on the dependent variable. Because quantitative studies attempt to verify theories, demographic variables (e.g., age, income level, educational level) typically enter these studies as intervening (or mediating) or moderating variables instead of major independent variables.
- Use the same pattern of word order in the questions or hypotheses to enable a reader to easily identify the major variables. This calls for repeating key phrases and positioning the variables with the independent first and concluding with the dependent in left-to-right order (as discussed in Chapter 6 on good purpose statements). An example of word order with independent variables stated first in the phrase follows.

Example 7.6 Standard Use of Language in Hypotheses

1. There is no relationship between utilization of ancillary support services and academic persistence for nontraditional-aged women college students.
2. There is no relationship between family support systems and academic persistence for nontraditional-aged college women.
3. There is no relationship between ancillary support services and family support systems for non-traditional-aged college women.

A Model for Descriptive Questions and Hypotheses

Consider a model for writing questions or hypotheses based on writing descriptive questions (describing something) followed by inferential questions or hypotheses (drawing inferences from a sample to a population). These questions or hypotheses include both independent and dependent variables. In this model, the writer specifies descriptive questions for *each* independent and dependent variable and important intervening or moderating variables. Inferential questions (or hypotheses) that relate variables or compare groups follow these descriptive questions. A final set of questions may add inferential questions or hypotheses in which variables are controlled.

Example 7.7 *Descriptive and Inferential Questions*

To illustrate this approach, a researcher wants to examine the relationship of critical thinking skills (an independent variable measured on an instrument) to student achievement (a dependent variable measured by grades) in science classes for eighth-grade students in a large metropolitan school district. The researcher moderates the assessment of critical thinking using prior grades as indicators in science classes and controls for parents' educational attainment. Following the proposed model, the research questions might be written as follows:

Descriptive Questions

1. How do the students rate on critical thinking skills? (A descriptive question focused on the independent variable)
2. What are the student's achievement levels (or grades) in science classes? (A descriptive question focused on the dependent variable)
3. What are the student's prior grades in science classes and their critical thinking skills? (A descriptive question focused on the moderating variable of prior grades)
4. What is the educational attainment of the parents of the eighth graders? (A descriptive question focused on a control variable, educational attainment of parents)

Inferential Questions

1. How does critical thinking ability relate to student achievement? (An inferential question relating the independent and the dependent variables)

(Continued)

(Continued)

2. How does critical thinking ability and prior grades influence student achievement? (An inferential question relating critical thinking times grades and student achievement)
3. How does critical thinking ability (or critical thinking ability times grades) relate to student achievement, controlling for the effects of the educational attainment of the eighth-graders' parents? (An inferential question relating the independent and the dependent variables, controlling for the effects of the controlled variable)

This example illustrated how to organize all the research questions into descriptive and inferential questions. In another example, a researcher may want to compare groups, and the language may change to reflect this comparison in the inferential questions. In other studies, many more independent and dependent variables may be present in the model being tested, and a longer list of descriptive and inferential questions would result. I recommend this descriptive-inferential model. This example also illustrated the use of variables to describe as well as relate. It specified the independent variables in the first position in the questions, the dependent in the second, and the control variable in the third. It employed demographics (grades) as a moderating variable rather than as central variables in the questions, and a reader needed to assume that the questions flowed from a theoretical model.

MIXED METHODS RESEARCH QUESTIONS AND HYPOTHESES

In discussions about methods, researchers typically do not see specific questions or hypotheses especially tailored to mixed methods research. However, discussion has begun concerning the use of a new type of research question—a mixed methods question—in studies and commentary as to how to design them (see Creswell & Plano Clark, 2011; Tashakkori & Creswell, 2007). A strong mixed methods study should contain the qualitative question, the quantitative question or hypothesis, and a mixed methods question. This configuration is necessary because mixed methods does not rely exclusively on either qualitative or quantitative research but on *both* forms of inquiry. Researchers should consider what types of questions should be presented and when and what information is most needed to convey the nature of the study:

- Both qualitative and quantitative research questions (or hypotheses) need to be advanced in a mixed methods study in order to narrow and

focus the purpose statement. These questions or hypotheses can be advanced at the beginning or when they emerge during a later phase of the research. For example, if the study begins with a quantitative phase, the investigator might introduce hypotheses. Later in the study, when the qualitative phase is addressed, the qualitative research questions appear.

- When writing these questions or hypotheses, follow the guidelines in this chapter for scripting good questions or hypotheses.
- Some attention should be given to the order of the research questions and hypotheses. In a two-phase project, the first-phase questions would come first, followed by the second-phase questions so that readers see them in the order in which they will be addressed in the proposed study. In a single-phase strategy of inquiry, the questions might be ordered according to the method that is given the most weight or priority in the design.
- In addition to quantitative questions/hypotheses and qualitative questions, include a **mixed methods research question** that directly addresses the mixing of the quantitative and qualitative strands of the research. This is the question that will be answered in the study based on the mixing (see Creswell & Plano Clark, 2011). This is an innovative form of a question in research methods, and Tashakkori and Creswell (2007, p. 208) call it a “hybrid” or “integrated” question. This mixed methods question could either be written at the beginning of a study or when it emerges during a study. For instance, in a single-phase study in which quantitative and qualitative data are collected simultaneously and merged, the mixed methods question could be advanced at the outset in the study. However, in a two-phase study in which one phase builds on the other, the mixed methods questions might be placed in a discussion between the two phases.
- The mixed methods question can be written in different ways. This can assume one of three forms. The first is to write it in a way that conveys the methods or procedures in a study (e.g., Does the qualitative data help explain the results from the initial quantitative phase of the study?). The second form is to write it in a way that conveys the content of the study (e.g., Does the theme of social support help to explain why some students become bullies in schools?) (see Tashakkori & Creswell, 2007). The third approach is to combine the methods and content (e.g., How does the qualitative interview data on student bullying further explain why social support, as measured quantitatively, tends to discourage bullying as measured on a bullying scale?).
- Consider how to present the quantitative, qualitative, and mixed methods questions in a mixed methods study. An ideal format would be to write the questions into separate sections, such as the quantitative questions or hypotheses, the qualitative questions, and the mixed methods question. This format highlights the importance of all three sets of questions

and draws the readers' attention to the separate quantitative and qualitative strands coming together (or being integrated) in a mixed methods study. Place the mixed methods question (written in methods or content or some combination form) last because the study will build to this element of the design.

Example 7.8 Hypotheses and Research Questions in a Mixed Methods Study

Houtz (1995) provided an example of a two-phase study with the separate quantitative and qualitative research hypotheses and questions stated in sections introducing each phase. She did not use a separate, distinct mixed methods research question because such a question had not been developed at the time of her project. Nevertheless, her study was a rigorous mixed methods investigation. She studied the differences between middle school (nontraditional) and junior high (traditional) instructional strategies for seventh-grade and eighth-grade students and their attitudes toward science and science achievement. Her study was conducted at a point when many schools were moving away from the 2-year junior high concept to the 3-year middle school (including sixth grade) approach to education. In this two-phase study, the first phase involved assessing pretest and posttest attitudes and achievement using scales and examination scores. Houtz then followed the quantitative results with qualitative interviews with science teachers, the school principal, and consultants. This second phase helped to explain differences and similarities in the two instructional approaches obtained in the first phase.

With a first-phase quantitative study, Houtz (1995) mentioned the hypotheses guiding her research:

It was hypothesized that there would be no significant difference between students in the middle school and those in the junior high in attitude toward science as a school subject. It was also hypothesized that there would be no significant difference between students in the middle school and those in the junior high in achievement in science (p. 630)

These hypotheses appeared at the beginning of the study as an introduction to the quantitative phase. Prior to the qualitative phase, Houtz (1995) raised questions to explore the quantitative results in more depth. Focusing in on the achievement test results, she interviewed science teachers, the principal, and the university consultants and asked three questions:

What differences currently exist between the middle school instructional strategy and the junior high instructional strategy at this school in transition? How has this transition period impacted science attitude and achievement of your students? How do teachers feel about this change process? (p. 649)

Examining this mixed methods study closely shows that the author included both quantitative and qualitative questions, specified them at the beginning of each phase of her study, and used good elements for writing both quantitative hypotheses and qualitative research questions. Had Houtz (1995) developed a mixed methods question, it might have been stated from a procedural perspective:

How do the interviews with teachers, the principal, and university consultants help to explain any quantitative differences in achievement for middle school and junior high students? (methods orientation)

Alternatively, the mixed methods question might have been written from a content orientation, such as the following:

How do the themes mentioned by the teachers help to explain why middle-school children score lower than the junior high students? (content orientation)

Example 7.9 A Mixed Methods Question Written Using Methods and Content Language

To what extent and in what ways do qualitative interviews with students and faculty members serve to contribute to a more comprehensive and nuanced understanding of this predicting relationship between CEEPT scores and student academic performance, via integrative mixed methods analysis?
(Lee & Greene, 2007, p. 369)

This is a good example of a mixed methods question focused on the intent of mixing, to integrate the qualitative interviews and the quantitative data, the relationship of scores and student performance. This question emphasized what the integration was attempting to accomplish—a comprehensive and nuanced understanding—and at the end of the article, the authors presented evidence answering this question.

SUMMARY

Research questions and hypotheses narrow the purpose statement and become major signposts for readers. Qualitative researchers ask at least one central question and several subquestions. They begin the questions with words such as *how* or *what* and use exploratory verbs, such as *explore*,

understand, or discover. They pose broad, general questions to allow the participants to explain their ideas. They also focus initially on one central phenomenon of interest. The questions may also mention the participants and the site for the research.

Quantitative researchers write either research questions or hypotheses. Both forms include variables that are described, related, or compared with the independent and dependent variables measured separately. In many quantitative proposals, writers use research questions; however, a more formal statement of research employs hypotheses. These hypotheses are predictions about the outcomes of the results, and they may be written as alternative hypotheses specifying the results to be expected (more or less, higher or lower of something). They also may be stated in the null form, indicating no expected difference or no relationship between groups on a dependent variable. Typically, the researcher writes the independent variable(s) first, followed by the dependent variable(s). One model for ordering the questions in a quantitative proposal is to begin with descriptive questions followed by the inferential questions that relate variables or compare groups.

I encourage mixed methods researchers to write quantitative, qualitative, and a mixed methods question into their studies. The mixed methods question might be written to emphasize the methods or the content of the study, or both, and these questions might be placed at different points in a study. By adding a mixed methods question, the researcher conveys the importance of integrating or combining the quantitative and qualitative elements. An ideal format would be to write the three types of questions into separate sections, such as the quantitative questions or hypotheses, the qualitative questions, and the mixed methods question into a study.

WRITING EXERCISES

Writing Exercises

1. For a qualitative study, write one or two central questions followed by five to seven subquestions.
2. For a quantitative study, write two sets of questions. The first set should be descriptive questions about the independent and dependent variables in the study. The second set should pose questions that describe and relate (or compare) the independent variable(s) with the dependent variable(s). This follows the model presented in this chapter for combining descriptive and inferential questions.
3. Write a mixed methods research question. Write the question to include *both* the methods of a study as well as the content.

ADDITIONAL READINGS

Morse, J. M. (1994). Designing funded qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 220–235). Thousand Oaks, CA: Sage.

Janice Morse, a nursing researcher, identifies and describes the major design issues involved in planning a qualitative project. She compares several strategies of inquiry and maps the type of research questions used in each strategy. For phenomenology and ethnography, the research calls for meaning and descriptive questions. For grounded theory, the questions need to address process whereas in ethnomethodology and discourse analysis, the questions relate to verbal interaction and dialogue. She indicates that the wording of the research question determines the focus and scope of the study.

Tashakkori, A., & Creswell, J. W. (2007). Exploring the nature of research questions in mixed methods research [Editorial]. *Journal of Mixed Methods Research*, 1(3), 207–211.

This editorial addresses the use and nature of research questions in mixed methods research. It highlights the importance of research questions in the process of research and discusses the need for a better understanding of the use of mixed methods questions. It asks, “How does one frame a research question in a mixed methods study?” (p. 207). Three models are presented: (a) writing separate quantitative and qualitative questions, (b) writing an overarching mixed methods question, or (c) writing research questions for each phase of a study as the research evolves.

Tuckman, B. W. (1999). *Conducting educational research* (5th ed.). Fort Worth, TX: Harcourt Brace.

Bruce Tuckman provides an entire chapter on constructing hypotheses. He identifies the origin of hypotheses in deductive theoretical positions and in inductive observations. He further defines and illustrates both alternative and null hypotheses and takes the reader through the hypothesis testing procedure.