Reading Statistics and Research *Schuyler W. Huck*
(Pearson Education Inc., Boston 2007)

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The number of researchers throughout the world has grown constantly in the last few decades. At the same time, the number of people encountering the results of different investigations has expanded even faster, almost geometrically. It is practically impossible to avoid exposure to research reports and findings.

Journals, newspapers, television and radio programs worldwide present thousands of scientific papers and results each year. Every university organizes scientific conferences and seminars. A great number of companies conduct their own investigations. Coworkers, friends and family members informally discuss research results among themselves. The Internet delivers access to countless scientific and quasi-scientific studies. The results of investigations of different kind and quality bombard people daily.

To avoid succumbing to faulty conclusions, erroneously conducted research methods or misinterpreted results, consumers should develop the skills necessary to protect themselves from overzealous or improperly trained researchers. Only studies with sound design and careful analysis of collected data lead to reliable research conclusions. Nonetheless, the conventional screening process only partially prevents poor studies' dissemination leaving the rest up to the consumer.

Reading Statistics and Research is an invaluable guide for those who find themselves at the receiving end of research summaries. Schuyler W. Huck outlines the main problems of presenting research results in scientific reports and seeks to enhance the reader's competency assessing the results of investigations in different scientific areas.

Besides benefiting consumers of scientific reports, this book is a great source of information for individuals who conduct research investigations - the researchers. Applied researchers should not only be skilled in adequately critiquing the studies cited within their own literature reviews, but should also be skilled in applying such knowledge to their own investigations. Doing so, their research results incorporate better designed studies, contain more appropriate statistical analyses, and lead to more justifiable conclusions and claims.

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According to Huck, this book's objectives are:
- to increase the reader's ability to decipher statistical jargon,
- to increase the reader's understanding of statistical tables and figures,
- to illustrate a variety of statistical procedures and the specific research questions they can each answer,
- to note the applications and limits of setting up and testing one or more null hypotheses,
- to approach how to detect the misuse of statistics,
- to distinguish between well-designed and poorly-designed research, and
- to build confidence when working with research reports.

The substantial body of knowledge *Reading Statistics and Research* (544 pages) presents is divided into 19 chapters. Huck makes a prudent, rich choice of areas to present, issues to analyze and theories to test - within the original framework: theory, structure and process - and includes a selection of contemporary issues.

The first chapter covers the typical format of a journal article and is an interesting introduction to different sections of research studies. Readers of the professional literature will find they can save time and effort in search of information if they are familiar with the typical format of journal articles and the nature of information normally included in each part of the article.

The second chapter of the book is called "Descriptive Statistics - The Univariate Case." Huck introduces descriptive techniques designed to summarize data on a single dependent variable. The chapter describes picture techniques for summarizing data, distributional shape techniques, the concept of central tendency and the variability of data.

In chapter three, "Bivariate Correlation," the reader will consider the collection and summary of data on two variables - with particular interest in the relationship between the two variables. Techniques this chapter presents remain fully descriptive in nature.

In the fourth chapter, Huck presents two measurement-related concepts: reliability and validity. The method section of scientific articles commonly includes a discussion of instrument quality. This chapter's objective is to help consumers of scientific reports refine their skills at deciphering and evaluating reports of reliability and validity.

The fifth chapter discusses the statistical application called inferential statistics. Inferential principles and techniques allow researchers to generalize their findings beyond the actual data sets obtained. The chapter describes basic principles of inferential statistics; simple notions of sample, population and scientific guess; main types of samples; certain problems that block the researcher's

effort to generalize findings to the desired population and a few tips for reading professional research reports.

Huck divides the sixth chapter into three main sections. The first section presents the logic and techniques of interval estimation. Next, Huck describes point estimation, a slightly different approach to estimation. Finally, Huck offers a few tips to handle research articles relying on the different forms of estimation.

The seventh chapter is dedicated to hypothesis testing, presenting its six-step process. After listing the various steps in their proper order (that is, the order a researcher ought to follow when engaged in this form of statistical inference), Huck discusses the function and logic of each step.

Chapter eight explains both the seven-step and nine-step procedures to testing null hypotheses. These additional steps in hypothesis testing are important when the researcher conducts an investigation to see if the statistical test had adequate power - known as 'post hoc power analysis'.

In the ninth chapter, Huck shows how researchers manage their correlation coefficients inferentially. The chapter begins by considering the statistical tests applied to various bivariate correlation coefficients and by examining the typical ways researchers communicate the results of their analyses. Next, Huck points out how to use the Bonferroni technique in conjunction with tests on correlation coefficients, how researchers compare two (or more) correlation coefficients to see if they are significantly different and how statistical tests can be applied to reliability and validity coefficients. The chapter closes with a few tips on assessing research claims that emanate from studies wherein inferential statistics are applied to correlation coefficients.

The tenth chapter examines inferences concerning one or two means, focusing on cases when a researcher computes either one or two sample means. Huck illustrates how studies concerned with one or two means use statistical tests and interval estimation. The chapter ends by considering the assumptions underlying inferential procedures and by examining the concept of 'overlapping distributions'.

The eleventh chapter focuses on the simplest version of ANOVA (one-way analysis of variance) and on how researchers present the results of this statistical method. Huck provides examples of using the Bonferroni adjustment technique in conjunction with one-way ANOVA, of testing the assumptions underlying a one-way ANOVA, and of researchers' concern with power analyses, measures of association and effect size. Finally, Huck shares tips on deciphering and critiquing the results of one-way ANOVA.

Chapter twelve, "Post Hoc and Planned Comparisons," considers the two categories of inferential procedures closely related to the one-way ANOVA. Using post hoc procedures, the researcher attempts to probe the data to ascertain the possible non-null scenario that is most likely true. Planned comparisons allow the researcher to answer specific questions about the population means and manage specific, a priori questions with less risk of a type II error.

Chapter thirteen studies two-way analysis of variance. Huck discusses this extremely popular statistical tool and extends to studies characterized by two independent variables. Chapter fourteen expands the discussion further to ANOVA with repeated measures.

The fifteenth chapter introduces analysis of covariance (ANCOVA). This ANOVA-like inferential strategy may substitute for any of the ANOVAs examined or referred to by the earlier chapters and is best considered an option to the analysis of variance. Any study can incorporate ANCOVA regardless of the number of factors involved or the between-versus-within nature of the factor(s).

Chapter sixteen investigates three different types of regression: bivariate, multiple and logistic. Huck reviews many other kinds of regression, but considers these three the most frequently used by applied researchers. He emphasizes the difference between measuring regression and correlation and closes the chapter with a few tips on deciphering and critiquing the results of regression analysis in scientific studies.

Chapter seventeen, "Inferences on Percentages, Proportions, and Frequencies," focuses on the array of inferential techniques designed for when none of the researcher's variables is quantitative. Huck considers six procedures for use with nominal-level data: a sign test, a binomial test, Fisher's Exact Test, a chi-square test, McNemar's test, and Cochran's test. Knowing these procedures puts the consumer of research studies in a good position to understand researcher's results when their data take the form of frequencies, percentages, or proportions. Huck also presents the z-test and Bonferroni technique.

The eighteenth chapter concerns statistical tests on ranks (nonparametric tests). This group of test procedures utilize the simplest kind of quantitative data: ranks. Huck presents five of the techniques most frequently used by applied researchers: the median test, the Mann-Whitney U test, the Kruskal-Wallis one-way analysis of variance of ranks, the Wilcoxon matched-pairs signed-ranks test, and the Friedman two-way analysis of variance of ranks.

Chapter nineteen is titled "The Quantitative Portion of Mixed Methods Studies." In many studies, scientists now conduct empirical research referred to as 'mixed methods study,' gathering, examining and using both quantitative and qualitative data as bases for drawing conclusions. Huck seeks to answer the question: how important is the quantitative portion of a mixed methods study? Several examples are taken from mixed methods studies to illustrate the kind of care that ought to be devoted to the quantitative portion of any mixed methods study.

A particular feature of this publication has to be emphasized. The hard copy of this publication is just one part to the whole - it is accompanied by a glossary, review questions, links to further readings and (under the restricted access) a link to 'Research Navigator.' Research Navigator provides readers quick access to instructional and contemporary publications, searchable by topic or key words, and is also a collection of research databases available to readers.