Preface

All teachers of statistics courses are doubtless aware of the negative attitude students often have toward learning about statistics. Further, most of us have wondered where this problem of attitude arises — with the teacher, the learner, or the course itself. Many teachers feel that students don't know what's best. Statistics is a bitter pill that must be taken for the student's own well-being. The same teachers often feel that the students will later look back on their elementary statistics course and realize that it was indeed valuable.

But does the problem really lie with the teacher or with the type of initial statistics course we give students? Few who teach statistics courses are data analysts; yet this is the course we try to teach. Using Greek and other mathematical symbols that few students understand we try to teach students data manipulation. In addition, we try to teach students when and how to use techniques such as a t-test; yet it is doubtful that any of them will ever have a need to analyze data using such a test, and it is just as doubtful that those who will have to run a t-test will do so properly. Is it necessary for a first course in statistics to teach data manipulation, or would we do better to emphasize the interpretation of statistics?

In order to answer this question, let us first decide how students are likely to come in contact with statistics. Rather than designing an experiment and collecting and analyzing the data, students are more likely to read the results of an experiment and need to interpret those results. Some students may never read research reports, but all will be exposed to newspapers, magazines, radio, and television. Through the media everyone comes in contact with statistics each day.

Statistics is more a language in this regard than a research tool. This language is often misused, giving our profession a bad name. [1] Misuse of the language of statistics is *statistical doublespeak.* Why don't we teach students how to understand statistics as a language so they can detect the statistical doublespeak they encounter in the media as well as in their fields of study? This book and the course for which it is designed have this very objective: *to teach students how to interpret statistics so they can detect statistical doublespeak in the media and in their fields of study.*

If we decide that a first course in statistics should emphasize the interpretation of statistics, what adjustments can be made in the usual course? First, symbolic formulas are not as necessary. Students are to be concerned with what a statistic means, not how to calculate the statistic. Many statisticians agree that the amount of formulation in elementary statistics courses need to be reduced. It is revolutionary, however, to eliminate all formulas. Many feel that this is a drastic step – and it is! But I have found that students accept it enthusiastically.

Elimination of symbolic language is but one feature of this text. Another problem I have encountered is teaching the half-dozen different tests of a particular statistical hypothesis. Students lose sight of the basic philosophy behind testing because they expend their energies trying to choose the "best" test from among the many possible ones. Again, this text makes a sharp departure from the traditional

approach. I concentrate on large sample tests of the proportion of a dichotomous population. Indeed, you can easily restrict the discussion of statistical inference to sections involving the proportion. Clearly such tests are only a tip of the iceberg, but the purpose is to get students to understand the principles of hypothesis testing without trying to make them decide which of many competing tests is "best."

If the symbolism is eliminated and the number of cases of statistical inference reduced, what is put in their place? Many of the topics that are not usually covered in a first course in statistics can be presented. These topics have been chosen in accordance with the course objective: to teach students how to interpret statistics so they can detect statistical doublespeak in the media and in their fields of study. Through the media students will primarily come in contact with sample survey results, economic statistics, and the results of epidemiological research. With the recent surge in epidemiological research into the causes of cancers and. heart disease, interpretation of the results such research is a topic to which all students should be introduced. I also discuss the design of sample surveys. This is an area of much statistical doublespeak in the media. I cannot talk about all of the many economic statistics, but I do discuss the Consumer Price Index some detail as well as the calculation of constant dollars. Both are topics of everyday importance to students.

This course ideally gets students to critically evaluate statistics in their area of study. Clearly, I cannot discuss in detail all such applications. What I do is present the basics of descriptive statistics, inferential statistics, experimental design, correlation, and regression. With this foundation I have found that students can apply basic principles of interpretation to the specific statistics in their area of study. Of course, if the students are all in one area of study, there isn't as much of a problem. The difficulty comes when a class is made up of students from many different areas. A teacher just is not likely to have expert in all the subject areas for which there are students. The adventurous are encouraged to venture into all the areas — there is so much for both the teacher and the student to learn. A teaching in this situation can restrict the emphasis to media examples. You'll note that this book has such an emphasis.

What can you, the teacher, look forward to? First, you'll teach a course that isn't likely to become boring to you, since material can be directed to statistics being emphasized in the media. For example, during elections preelection polling can be emphasized. Following the outbreak of Legionnaire's disease my class spent extra time studying epidemiology. The course is consequently fun to teach. Second, your students will become genuinely interested in learning about statistics

– What a treat this is!

Contents