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A CUSTOMIZED EXCEL DATA ANALYSIS SYSTEM FOR USE IN UNDERGRADUATE MARKETING RESEARCH

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ABSTRACT

This paper describes the difficulties marketing research that instructors encounter when using statistical software packages. One of the difficulties in teaching arises from the nature of the statistical software packages available. Specifically, standard output in these packages generates many values by default. Students must learn "where to find" the values important for their particular analysis. Also, there are many options which may be selected to run a single procedure, and these are confusing to students. A third problem lies in using the output tables in word processing software. This paper presents a new type of data analysis software, XL Data Analyst, which overcomes these problems. The XL Data Analyst's features and output are compared with SPSS.

INTRODUCTION

The teaching of marketing research to undergraduates is challenging for several reasons, and various authors have written about innovative and engaging pedagogical approaches. These approaches have ranged from computer-based facilitators (e.g., Burns, Burns, and Bush (1995), Cort and Dominguez (1975), Finn (1987), Gentry (1979), McKay (1975), Rubin (1990), and Stanton (1977)) to experiential endeavors (e.g., Burns (1978), Fuller (1988), Lawton (1987), Niffenegger (1982), and Richardson (1979)).

STATISTICS (ANALYSIS SOFTWARE) ARE THE PITS

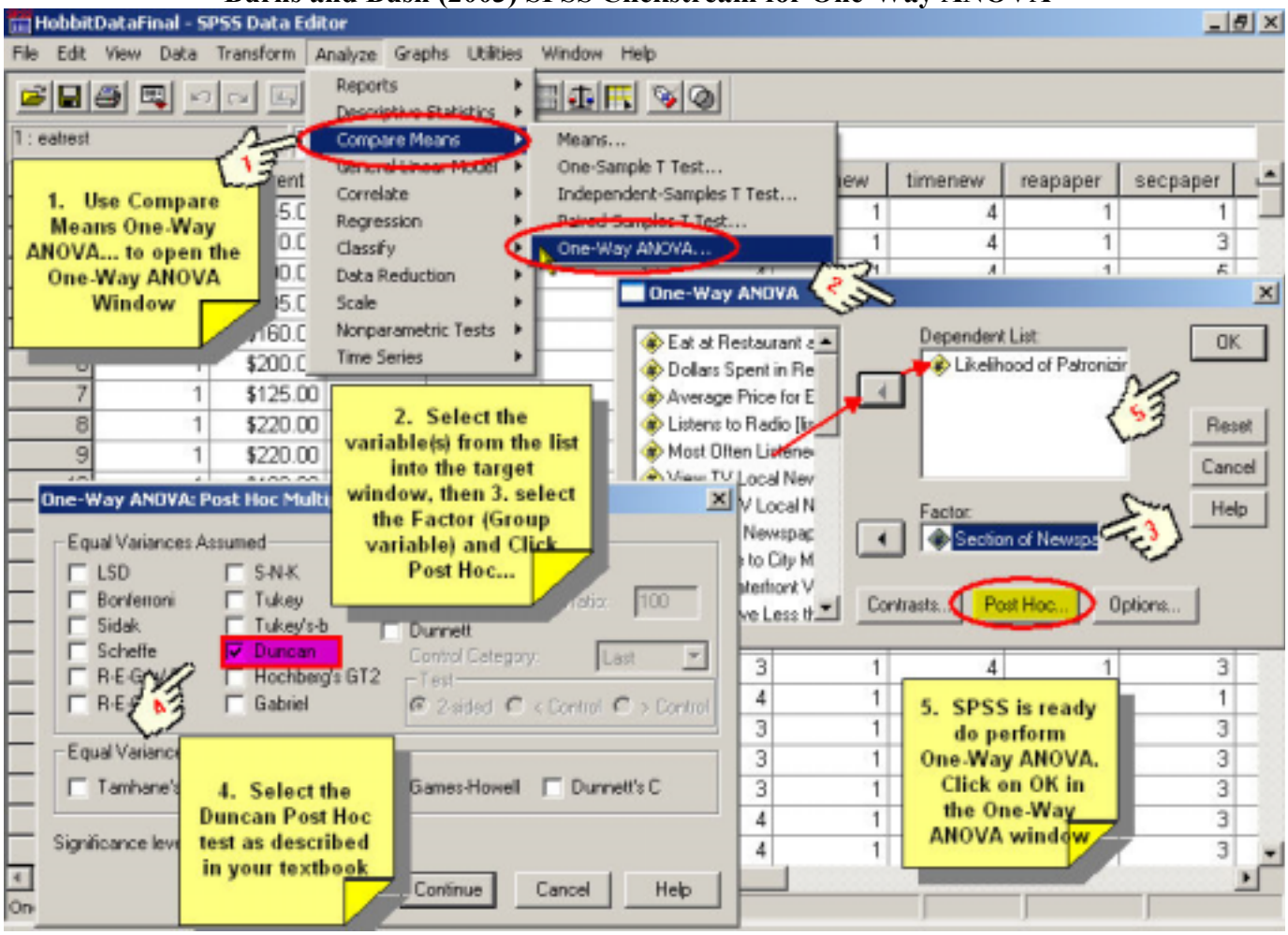
Over 50 years ago, Robert Ferber (1951) commented on the "lack of coherence between the business statistics course and the marketing course." This lack of coherence is most apparent in the marketing research course where no matter what fresh approach is adopted, if any, the teacher of marketing research cannot avoid using statistics. Specifically, this paper describes the difficulties marketing research instructors can encounter when using a statistical software package such as SPSS, SAS, Minitab, Analyse-it™, or even Excel's Data Analysis Tool. These difficulties and frustrations emanate from two sources. First, the instructor must teach (or reteach) statistics. If a poll were conducted, statistical analysis would most certainly be voted the least favorite subject of business students. From the authors' combined experience of decades of teaching undergraduate marketing research, we can attest with great confidence that marketing research students not only have voided their memories of any statistical knowledge whatsoever, but they also have attached huge amounts of negative affect onto the topic. In other words, the typical student abhors statistics with great passion.

The second source of the marketing research instructor's difficulties with statistics lies with whatever statistical analysis software he/she uses. There are two aspects to this issue. One difficulty is that learning a new program, particularly one as complicated as a statistical analysis program, is not a delight to students. Frankly, it is a considerable challenge to students. As Tam and Siu (1996) have noted, "…students may feel stranded

when faced with the required use of unfamiliar computer packages for statistical analysis in marketing research courses." As an interesting side note, Tam and Siu (1996) were referring to Hong Kong (i.e., Asian) students who are typically better prepared than U.S. students in mathematical concepts.

The other troublesome aspect of statistical analysis programs is that, quite properly, statistical analysis programs generate statistical values of many kinds by default, and they have features that allow users to request and receive a great many other statistical values as well. As a quick example, consider SPSS's One-way ANOVA routine. By default, there are 10 different statistical values (SSWithin, SSBetween, SSTotal, Withindf, Betweendf, Totaldf, MSWithin, MSBetween, F, and Sig). There are 14 equal variances and 4 unequal variances post hoc tests that can be requested, up to 6 optional statistics, and 3+ types of contrasts that can be requested. While instructors of marketing research are cognizant of the need for all of these statistical values, it is a very daunting task to teach undergraduate students how to navigate statistical software and how to deal with standard statistical output generated by these programs.

Figure 1
Burns and Bush (2003) SPSS Clickstream for One-Way ANOVA

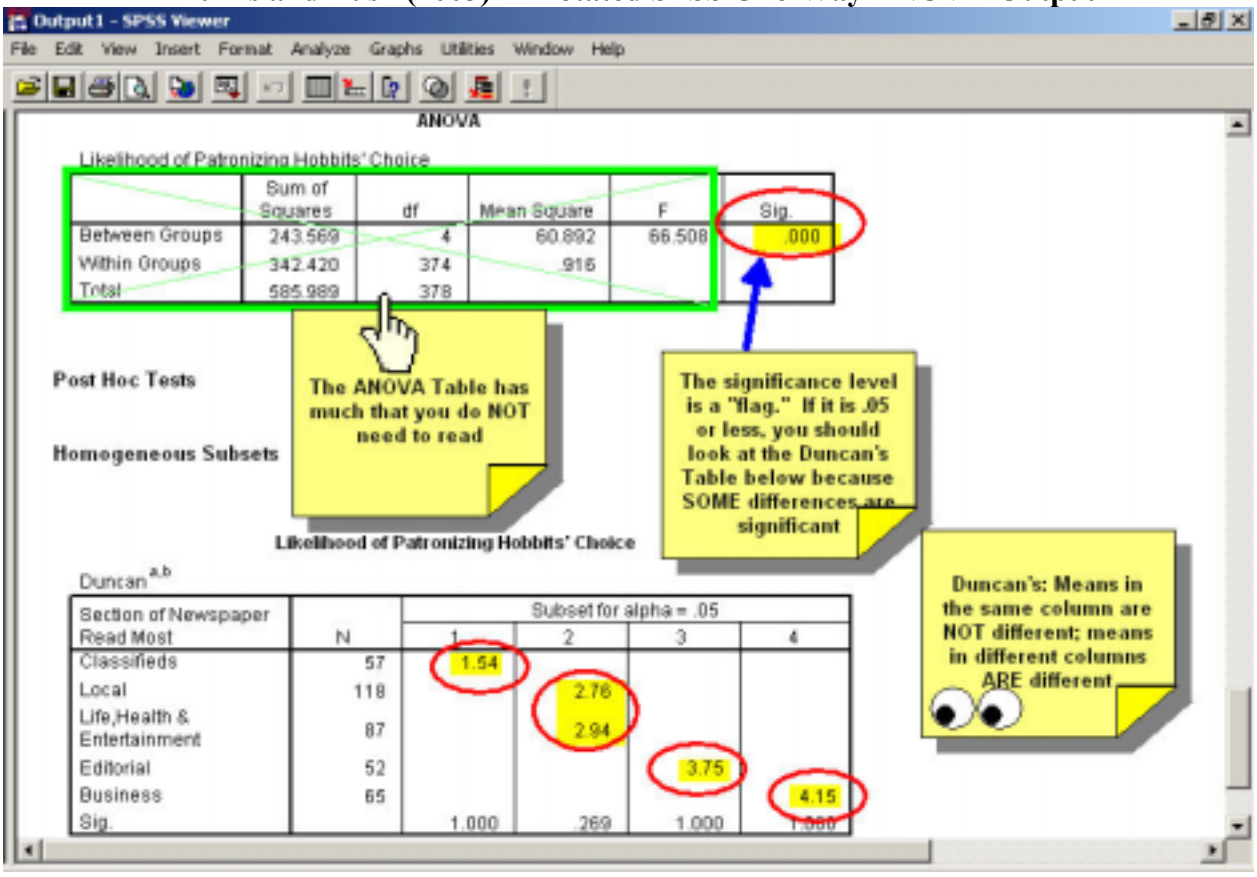


Marketing research textbook authors have wrestled with statistical analysis program navigation and output interpretation. As an example, we will use Burns and Bush's (2003) treatment of SPSS for Windows Student Version that comes packaged with their textbook. In fact, these authors claim that their book is "integrated" with SPSS (Preface, page xix). Burns and Bush (2003) innovated the concept of "clickstreams" which are annotated screen captures that show the cursor point-and-click sequence that is used in SPSS to obtain statistical values. Figure 1 is taken from this textbook's website (*www.mktgresearch.com*) and found in the textbook (page 507). As can be seen, the approach they use is a numbered clip art "hand" pointer that shows the cursor motion and clicks along with post-it notes that explain each step. Burns and Bush (2003) also use a web-based (or downloadable stand-alone) ancillary called the "SPSS Student Assistant" that has screen capture videos that show the cursor's motions and clicks. This learning aid is an improvement of its earlier version (Burns, Burns, and Bush, 1995). In addition to the improved SPSS Student Assistant, and in order to deal with the statistical output generated by SPSS,

these authors created annotated SPSS output. Figure 2 shows the annotated ANOVA output (page 508). As can be seen in Figure 2, the relevant aspects of the ANOVA output are highlighted and explained with the use of post-it note clip art, arrows, circles, highlights, and even X-outs.

At the risk of repeating ourselves, the clickstream/annotated approach demonstrates that students need a great deal of assistance to learn how to make a statistical analysis program generate the desired analysis, and they require detailed instruction on where to look in the generated output and how to interpret what they find when they look at the right place. The second point reveals that there is, in fact, a considerable disconnect between statistical analysis program output and the practical interpretation and use of the findings. Marketing research instructors are focused on the practical, meaning that they want their students to comprehend the basic statistical findings and to interpret these into a managerially meaningful (i.e., practical) presentation format. Stated simply, marketing researchers construct tables and graphs that communicate their findings to their clients. While SPSS has the feature of "Tablelooks" that enables formatting of SPSS output tables into a professional appearance, they remain statistical analysis output tables unless the user does considerable reworking in Tablelooks. Plus, there are subtle issues with copying and pasting SPSS tables into a word processor program just as there are with the SPSS Graph feature. To avoid these, one of the authors of this paper instructs his undergraduate marketing research students to copy and paste SPSS output tables into Microsoft Excel where they can be reworked, formatted, and/or converted to graphs with ease.

Figure 2
Burns and Bush (2003) Annotated SPSS One-Way ANOVA Output



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THE *XL DATA ANALYST*

In a particularly lucid moment, two of the authors of this paper conceived of a better way to overcome these difficulties. In particular, since Microsoft Office Suite is the standard adopted by a very large majority of universities, and a great many business schools require their students to be proficient in Microsoft Office, the decision was made to develop a data analysis system that runs on Excel. As a bit of background, in the 1990's, SPSS was the statistics analysis program used by many business schools in the business statistics course. This adoption of SPSS greatly facilitated the use of SPSS in the marketing research course as students entered the course with good familiarity of SPSS's set up and functionality. However, for various reasons, there has been a move away from the traditional statistical analysis programs such as SPSS to the use of Excel in the basic statistics course. Levine (2000) has commented that "Microsoft Excel in an elementary statistics class seems a natural alternative to the computing battles and

stresses associated with using some of the more standard statistical software packages."

With the decision to use Excel as the foundation data analysis vehicle, an exhaustive search was conducted for Excel-based statistical analysis programs, and a handful was found including Analyse-it™, Excel's Data Analysis Tool, and XLStat©. Close inspection of these revealed that while they did use familiar features of Excel, their output was essentially the same as SPSS, SAS, or other statistical analysis software programs. The authors also discovered Excel statistical analysis macro systems developed for statistics books (e.g., Sincich, Levine, and Stephan (1999)); however, these were also rejected for the identical reasonThus, the decision was made to develop a macro system for Excel that performs all of the analyses taught in an undergraduate marketing research course but which would produce output that students could readily interpret. Moreover, the output would be formatted into professionally-appearing tables, and since the output would be in Excel, users could easily use Excel graph features to create visual presentations. Since the Microsoft Office suite would be the platform, the tables and graphs could be seamlessly moved into Microsoft Word or PowerPoint. This vision guided the creation of the *XL Data Analyst*, a macro system that operates within Excel using Excel spreadsheet features and functions and programmed with Visual Basic for features that were necessary but not within Excel. Development took place with one author writing Excel macros to execute the various statistical analyses and output tables, another author writing Visual Basic code embedded in the macros to effect a user-friendly menu- and variables-selection windows system, and the other authors alpha testing the system as well as providing constructive comments and suggestions throughout the development of the *XL Data Analyst*.

In its present form, the *XL Data Analyst* is an Excel macro system that creates a menu item called "XL Data Analyst" in Excel's top menu, and this menu item operates with a cascading menu (See Figure 3) to enable a user to request any of the analyses or computational routines listed in Table 1. As can be seen, the *XL Data Analyst* accommodates data analyses treated in most undergraduate marketing research textbooks. Data is entered and stored in rows and columns with the columns corresponding to questions (variables) on the questionnaire, and the rows corresponding to respondents. The first row of the Data worksheet is reserved for variable names, and a "Define Variables" worksheet links the variables to their respective long description (e.g, Respondent's place of dwelling) value codes (e.g, 1, 2, 3, 4), and value labels (House, Mobile home, Apartment, Homeless). When a user selects a type of data analysis via point and click, the *XL Data Analyst* opens up a selection window appropriate for that analysis with prompts as to what to select. A click on "OK" activates the analysis.

Figure 3
XL Data Analyst Menu and Variable Selection Menu

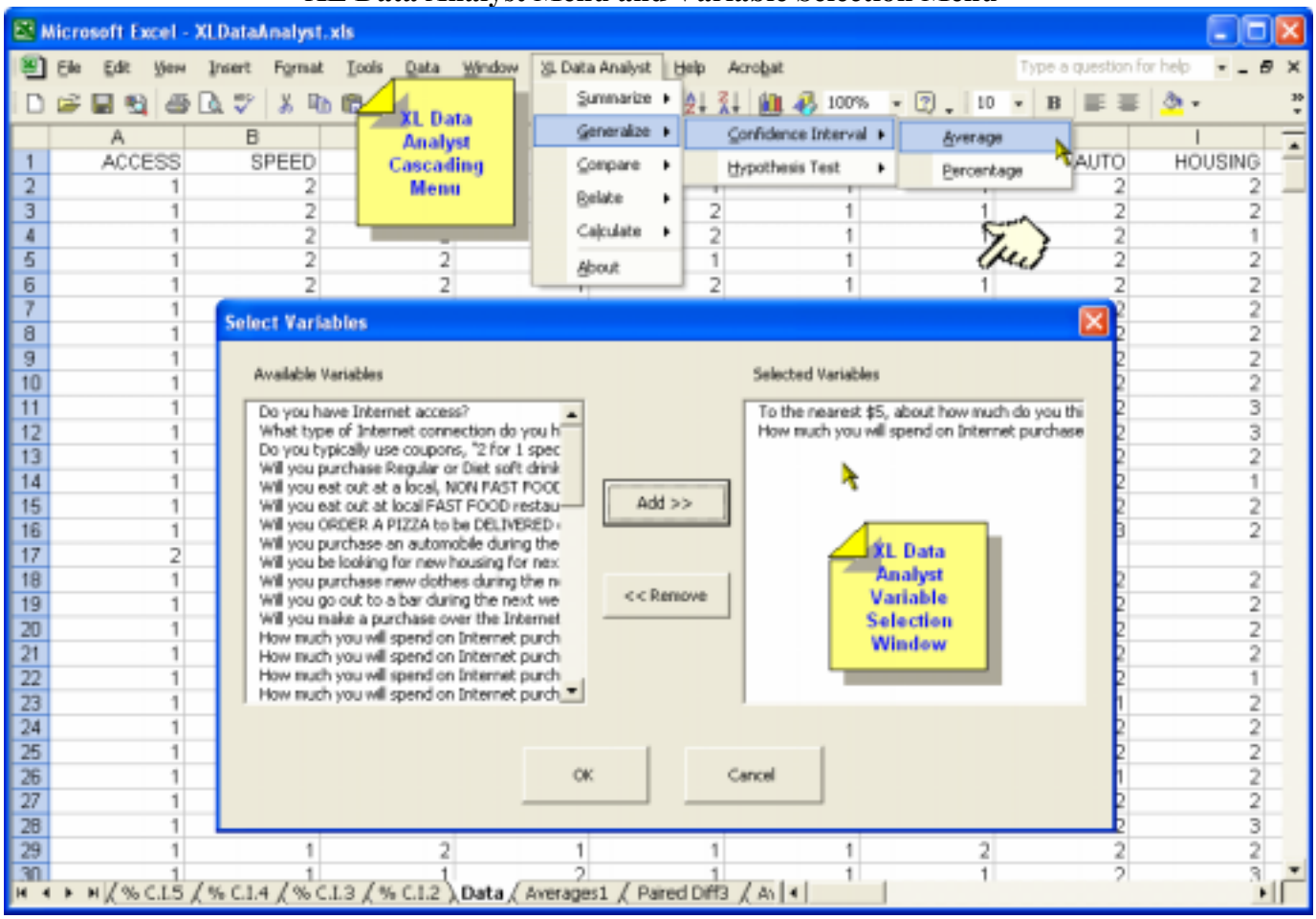

Table 1
Data Analyses and Computational Routines in the *XL Data Analyst*

XL Data Analyst Menu	Analyses/Routines (Submenus)
Summarize	• Averages (standard deviation, maximum, minimum) • Percents (frequencies, percentages)
Generalize	• Confidence intervals for an average • Confidence intervals for a percent • Hypothesis test for an average • Hypothesis test for a percent
Compare	• 2 group percents • 2 group averages • 3+ group averages • Paired variables averages
Relate	• Crosstabulations • Correlations • Regression
Calculate	• Random numbers • Sample size

The *XL Data Analyst* has been programmed to generate 2 types of analysis output. First and foremost, it creates an interpreted professional table. That is, the table is laid out such that it can be copied and pasted directly into a report or other presentation vehicle. Moreover, the table reports any statistical findings (at the 95% level of confidence) in a straightforward manner. See Figure 4, for instance, on how the *XL Data Analyst* presents the findings of an ANOVA. With the *XL Data Analyst*, the table identifying significant differences (or not) between the various group means appears only if there is a significant F value result (95% level of confidence). If the F value is nonsignificant at the 95% level of confidence, a simple message appears that indicates to the user that there is no significant difference between any of the group means. At the same time, the *XL Data Analyst* generates and reports the appropriate statistical values in case the user wishes to examine them. As can be seen in Figure 4, the statistical values are set off to the side, arranged in a table with gray background, and identified with cryptic labels. The assumption is that if a user intends to examine the statistical values, he/she will be sufficiently familiar with them to understand the labels. The gray background implies to students that the statistical values are not paramount.

XL DATA ANALYST COMPARED TO SPSS

In this section of our paper, we will compare the *XL Data Analyst* to SPSS for Windows Student Version. There are two reasons for this comparison. First, we are intimately familiar with SPSS as we have used it a great many years, and, second, SPSS is the market leader. So, presumably, we are comparing the *XL Data Analyst* with the statistical program that has become the standard for a great many marketing research instructors. Table 2 presents our comparison of these two software vehicles, and it illustrates that the difficulties previously mentioned with teaching marketing research using SPSS are overcome by the *XL Data Analyst*. Specifically, the *XL Data Analyst* yields interpreted analyses in professional tables that can be turned into Microsoft Excel graphs using the Excel graphing features and pasted into a presentation document such as Microsoft Word or PowerPoint with ease. The capacity of the *XL Data Analyst* far exceeds that allowed by SPSS Student Version, and there are other criteria such as: lower cost, minimum menu options, less required background knowledge of statistics that render the *XL Data Analyst* more attractive than SPSS Student Version.

Figure 4
XL Data Analyst Interpreted Output

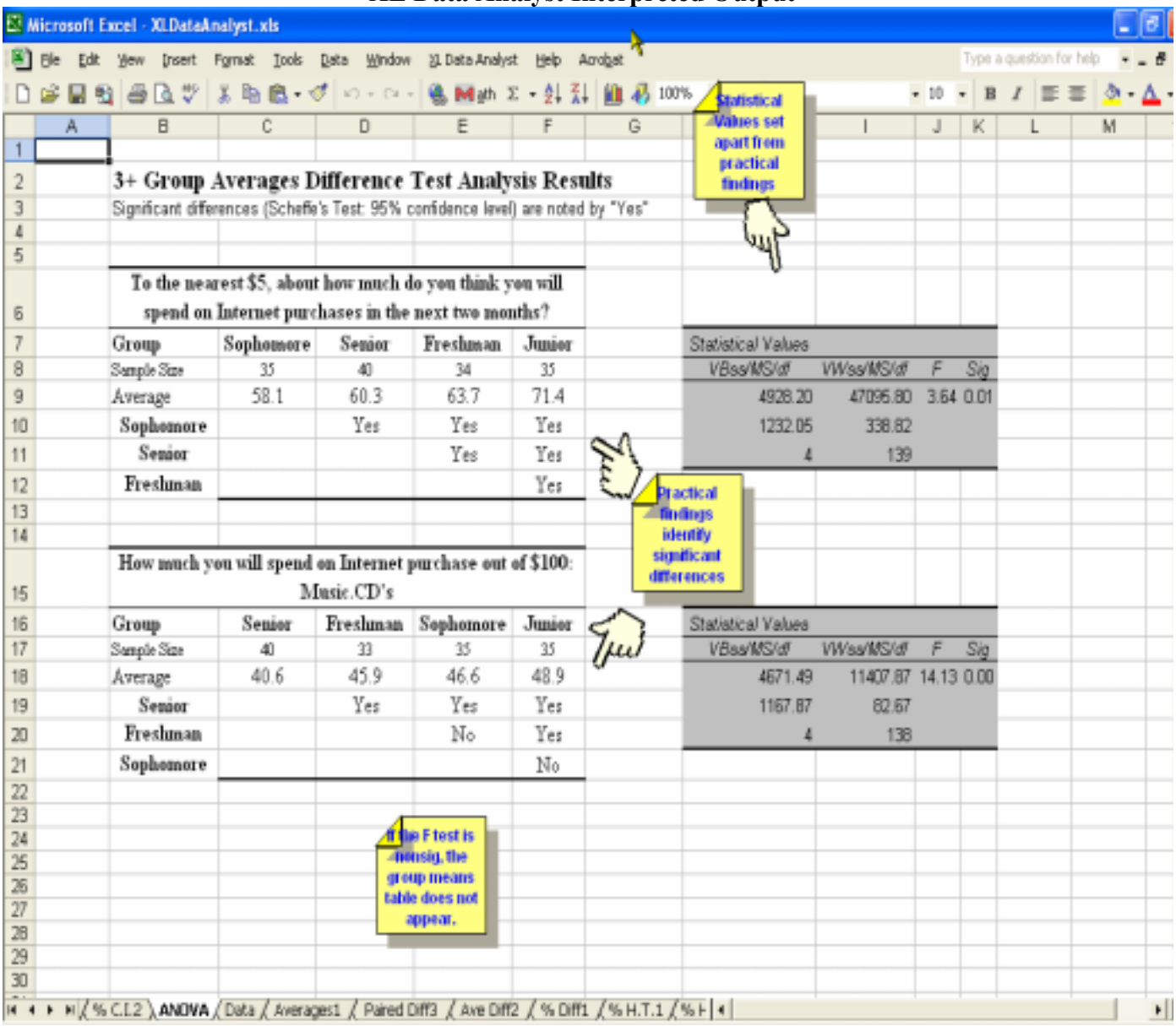

Table 2
Comparison of *XL Data Analyst* to SPSS for Windows Student Version

Feature/Aspect	SPSS Student Version	*XL Data Analyst*
Usefulness of Output		
Interpreted findings?	None	Always
Professional tables?	Possible with "TableLooks"	Standard output
Graphs?	Possible with SPSS Graph feature*	Excel graphs
Works with Microsoft Word, PowerPoint, etc?	Can encounter pasting issues	Seamless
Capacity Aspects		
Maximum Number of Variables?	50	255
Maximum number of records?	1500	65,535
Other Considerations		
Cost?	$100	Undetermined
Menu names	Largely statistical (e.g. One Sample T-Test)	Practical (e.g. Confidence Intervals-Average)
Menu statistics options?	Many	Few
Required knowledge?	Requires some statistical knowledge	Requires minimal statistical knowledge
Sample size calculations?	None	For percentage estimates

*Or can paste SPSS tables into an Excel spreadsheet and then use Excel graph features

CURRENT AND EXPECTED STATUS OF THE *XL DATA ANALYST*

The *XL Data Analyst* was developed in 2003, and it will enter into Beta testing at the end of this same year. It will continue to be tested by the authors and others and refined while a marketing research textbook is written that integrates the *XL Data Analyst* as its data analysis software program. Plans are to see this textbook in print sometime in 2004. At that time this new approach will undergo the most difficult of all tests, the reaction of the marketplace. Hopefully, the *XL Data Analyst* will lead to an improvement in the way students learn and use statistical software.

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