Software Review

Projects in Experimental Psychology: Software for several classical perception experiments

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Projects in Experimental Psychology (Sorkin, 1997) is a Windows-based series of nine classical perception experiments. It is primarily designed for laboratory use in perception and related courses. The program is generally simple to use and exploits the "point-and-click" features of Windows quite well. It complements, rather than competes with, Levy and Ransdell's (1998) *Laboratory in Cognition and Perception*, which is more suitable for courses in memory. Projects can be extremely useful in laboratory courses in perception and cognition, although the number and range of studies may presently be too limited to be the exclusive source of data in these courses. Although instructors proficient with experiment generators such as MEL (Schneider, 1998) or ERTS (Beringer, 1992) may opt to design their own experiments, this is an excellent alternative for those who lack the time or the background to do so.

Projects in Experimental Psychology

By R. D. Sorkin, 1997.

Bayport, NY: Life Science Associates. \$295 + \$7.95 shipping and handling.

Projects in Experimental Psychology (Sorkin, 1997) is an integrated series of nine classical experiments designed for classroom use. It includes experiments in categorical perception, numerosity estimation, Fitts' law, image rotation, reaction time, signal detection, tracking, visual attention, and working memory. One of its major features is its simplicity. Although its interface can be improved, it requires minimal technical support, and all but the most computer phobic students can gather their own data with minimal instruction. A demonstration version is available (<http://Lifesciassoc.home.pipeline.com/instruct/projects/sorkin.htm>). The publisher is Life Science Associates, One Fenimore Road, Bayport, NY 11705-2115, (516) 472-2111 (V), (516) 472-8146 (F), and lifesciassoc@pipeline.com (e-mail).

Levy and Ransdell's (1998) *Laboratory in Cognition and Perception* bears many similarities to Sorkin's (1997) *Projects in Experimental Psychology*. The most specific similarity is that they both consist of well-known experiments that require minimal development to use. However, a comparative review is not appropriate, because they are designed for different courses. Sorkin's *Projects* is de-

signed for a course in perception in which relatively little time is devoted to topics in memory; Levy and Ransdell's *Laboratory* is designed for a converse type of course. Those interested in the latter may obtain a 30-day trial version (www.psychologysoftware.com).

INSTALLATION

Installation of *Projects* simply consists of copying the contents of two floppies to a directory of one's choice. Each floppy contains an executable zip file, so all one needs to do is to click on the copy of each zip file to create the final program. The program only requires 4.25 MB of disk space, exclusive of these two files. There is no installation manual, and none is needed once you locate the file named *Main.doc*. Unfortunately, the extraction process has some minor problems. It produced various numbers of files on the three machines tested, all of which had ample disk space. After extraction, the user should check the directory contents against the files listed in a supplied Microsoft Word file, *Expfiles.doc*, generated in the extraction process. As long as the instructor is careful, when installing the software, to leave enough time to obtain any missing files and has enough free disk space, obtaining the missing files should not be difficult. Consequently, I do not consider this extraction failure to be a major problem. It is not clear why this problem occurred.

GOALS OF THE PACKAGE

Sorkin (1997) indicates that the program will run on any PC operating under Windows 3.1 or higher, although one obviously needs a sound card to perform the auditory experiments. I used a Pentium 300 running under Windows 98 for this evaluation. No attempt was made to evaluate

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Figure 1. Introductory page for the experiment on perceived numerosity.

timing accuracy. Although always an issue for a program run under Windows, this was not felt to be critical, since the package is not designed for original research. Although I did not have the opportunity to use the program in an actual class, I do not anticipate that students will have great difficulty in learning how to use the program to gather data (data analysis will be discussed below), as long as they are given reasonable supervision. At the same time, there definitely needs to be a knowledgeable user in attendance, since some of the "hint" boxes that instruct students in setting up the various experiments could stand improvement. The background material describing each experiment is good, but students will need to (and should) consult primary sources. Some experiments, like signal detection, may require students to pilot experimental parameters, such as signal intensity, but I see this as a relevant experience, rather than as a barrier.

Sorkin (1997) describes his goals in the following words: "The laboratory projects allow students to serve as their own experimental participants, obtaining data that supports classical 'laws' or phenomena without the need to pool data from multiple subjects or perform complex statistical analyses. Each project writes its data to an ASCII data file, suitable for input into a spreadsheet or statistical program. Each project has an integrated labora-

tory manual that provides introductory material, key references, technical information, and hints on how to analyze the data using a spreadsheet program. The level of data analysis is flexible and may be set by the instructor. Most of the projects allow for either simple or complex analyses, depending on the course level and goals." The statement is accurate. Sorkin also notes that additional studies are planned.

RUNNING THE PROGRAM

Clicking Main.exe opens the program to the menu of experiments, with a superimposed "About" screen containing the addresses of the author and publisher. The user clicks on "Continue" to eliminate the "About" screen and run any of the experiments. At that point, the icons and names representing the experiments change from saying "Demo" (evidently a carryover from the demonstration version) to "Full" and can be opened when clicked on or when the title is selected from the Project Menu. If the experiment is selected from the Project Menu, the user can read a description or run the experiment (selecting the icon starts the experiment without the description option). When the experiment is run, there is a help file, denoted a lab manual, to explain the goals of the exper-

Figure 2. Parameter page for the experiment on perceived numerosity.

iment and the meanings of the various settings. The lab manual is in familiar Windows HLP format and consists of a title page, an introduction, parameters, procedure, instructions, data analysis, technical details, and references (unfortunately, the help file for the reaction time module was missing from my review copy). The manuals make a variety of points that may not be generally known, such as the role that Fitts's (1954) law had in IBM's choice of the mouse as a pointing device.

The experiments in the series are all well known and allow the user to vary several basic parameters. For example, the signal detection experiment contains settings for number of trial blocks, number of trials/block, noise level (in necessarily arbitrary but replicable units—the output value will reflect the computer's sound levels as well as the program's), and, for each trial block, the signal level and signal probability. The user is instructed to pretest the settings, to make the task suitably difficult. Some modules, such as that for Fitts's (1954) law, contain a separate demonstration of the effect. A demonstration can be run separately from the actual experiment, to make the phenomenon clearer. Signal and noise can be independently demonstrated and set. Currently, the signal detection module only generates a yes–no experiment in-

volving the detection of a sine wave in white noise; one possible modification would be to allow the instructor to compare performance in this task with that in a forced-choice task, for example.

Data analysis, as a separate event from data gathering, is in many ways the bane of any program such as this, because it is necessarily dependent on students' grasp of basic statistics and, indeed, of arithmetic. The analyses do not seem difficult to an undergraduate who has an appropriate grasp. However, institutions vary widely in the skills they teach, and students vary at least as widely in the skills they acquire. Consequently, whether this package is used or not, much of this part of any laboratory course is beyond the instructor's control, and instructors probably will have to participate in the data analysis. Sorkin (1997) did not claim that the program could be used in total independence of the instructor; I doubt any program designed for an audience of advanced undergraduates could honestly make this statement.

Example: Numerosity Estimation

The numerosity estimation experiment will serve as an illustration, since it is one of the more graphic modules. Upon selecting it, the introduction page appears, as

Figure 3. Test display for the experiment on perceived numerosity.

shown in Figure 1. The "About" statement was moved to make the "Welcome" fully visible, but it covers the "Next" button.

Pressing the "Next" button leads to the page containing the parameters, shown in Figure 2. Note the three "hint" boxes, which may lead to a bit of confusion.

Once any modifications have been made, the "Start" button is pressed, leading to the display. The participant then starts the display, leading to a stimulus, as shown in Figure 3. Feedback is provided as to the actual and judged number of dots, which is not visible in this figure.

When the data have been gathered, the participant exits, which allows the participant to look at the data file and save it. The data file is in comma-delimited form, so it may easily be analyzed via spreadsheet, SPSS, SAS, or other statistical programs.

EVALUATION

Many universities are finding that money for computer-related purchases is relatively available, perhaps in the untested belief that computers can replace instructors and save money in the end. At the same time, there are also signs of resistance to these expenditures. This resistance

may limit future computer-related expenditures, unless these expenditures can be proven effective.

Many applications utilize "off-the-shelf" microcomputers. Two general routes can be taken in running classroom experiments. One can use a general-purpose experiment generator, such as Experimental Run Time System (ERTS; Beringer, 1992) or Micro Experimental Laboratory (MEL; Schneider, 1988), or one can use a program like Sorkin's (1997) or Levy and Ransdell's (1998). ERTS and MEL offer the maximum in flexibility, so an instructor can deliver precisely the experiment he/she desires. These programs have been available for a decade. Some faculty use graduate students to write programs, and more affluent departments hire technicians. However, programs like Projects allow the technologically unsophisticated to conduct highly didactic experiments. A basic point is that there is minimal overhead required for teaching how the system works. This is especially important, since money spent to acquire hardware and software has not been remotely paralleled by money spent on training individuals in their use.

The ease with which Projects in Experimental Psychology can be run is a major factor favoring its acquisition when needed technical support is sparse. Many in-

structors quite properly would resist a system that is difficult to learn, when it only has a limited number of options. Furthermore, it is a tribute to experimental psychology as a whole that many experiments can readily be programmed as laboratory exercises or lecture demonstrations. Of course, the present program is not the only one to perform this task, but it does so well.

At the same time, the selection of nine experiments, as good as they are, is limited. The material may be used in psychology courses, or it may be made part of a more general course in cognitive psychology, where studies in memory are vital, but there is only one module devoted to this topic. It might be used in a course in human factors, although, in my experience, few such courses are offered with a laboratory. Depending on the way the course is taught, even a course focused on perception may not devote much time to such topics as ergonomics. As good and as simple to use as the package is, instructors may not wish to mix programs and interfaces, if students work at their own workstations. They might have to, however, given the somewhat limited range and number of experiments. In addition, the interface of the various experiments with students can stand improvement, to ensure, for example, that the location of the "Start" button is always in the same place. This would probably be a minor point. However, several experiments are designed to illustrate the basic human factors concepts, but the program interface does not always implement these concepts. On the other hand, the signal detection demonstration has wide applicability. This, of course, implies the need for a greater number and variety of experiments, an ob-

vious goal for a second generation of this highly attractive program.

SUMMARY

I would strongly recommend Sorkin's (1997) *Projects in Experimental Psychology* for any laboratory course that stresses perception. It can also be used in lectures outside of a laboratory context. The package is particularly useful when there is inadequate technical support for instructors to design their own programs. I hope that future revisions will provide more experiments and rectify some minor problems with the interface and with file extraction.

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